WHOLESALE PRICES-CURRENT of Food-grains, Firewood, and Salt in

PRICES PER MAUND

Number.	MARTS.	WHEAT.			BARLEY.			RICE, BEST SORT.			RICE, COMMON.			BULRUSH MILLET—CUMBOO, BAJRA.		
		Present return.	Next preceding return.	Corresponding return of last year.	Present return.	Next preceding return.	Corresponding return of last year.	Present return.	Next preceding return.	Corresponding return of last year.	Present return.	Next preceding return.	Corresponding return of last year.	Present return.	Next preceding return.	Corresponding return of last year.
		R. A. P.	R. A. P.	R. A. P.	R. A. P.	R. A. P.	R. A. P.	R. A. P.	R. A. P.	R. A. P.	R. A. P.	R. A. P.	R. A. P.	R. A. P.	R. A. P.	R. A
1	Calcutta ...	2 14 0	2 14 0	2 10 0	1 4 0	1 4 0	1 8 0	5 0 0	5 0 0	6 0 0	2 11 0	2 8 0	3 0 0	...	...	...
2	Serajgunge ...	1 8 0	...	1 10 0	...	...	...	3 12 0	...	3 8 0	1 7 0	...	2 4 0	...	...	...
3	Dacca ...	3 0 0	3 0 0	2 10 0	1 0 0	1 0 0	1 1 0	1 12 0	1 8 0	1 9 0	1 6 0	1 5 0	1 7 0	...	...	...
4	Naraingunge..	...	...	...	...	...	...	1 6 0	1 8 0	1 6 0	1 4 0	1 4 0	1 2 0	...	...	...
5	Chittagong ...	...	...	...	...	...	...	2 8 0	2 8 0	2 3 0	1 11 0	1 11 0	1 9 0	...	...	...
6	Patna ...	1 13 0	1 10 0	1 13 0	1 0 0	1 0 0	1 4 0	2 14 0	2 14 0	3 0 0	1 13 0	1 13 0	2 0 0	...	...	...
7	Balasore ...	3 2 0	3 1 0	2 8 0	...	...	...	1 12 0	1 12 0	2 0 0	1 3 0	1 3 0	1 9 0	...	...	...
8	Pooree ...	...	...	...	...	...	...	...	...	...	1 9 3	1 9 3	1 12 0	...	...	...
9	Cuttack ...	2 5 0	2 4 0	2 2 0	...	...	...	2 5 0	2 5 0	2 12 0	1 9 0	1 9 0	1 14 0	...	...	...

CALCUTTA,
The 8th November 1881.

the undermentioned Marts of Bengal for the Fortnight ending 31*st October* 1881.

OF 40 SEERS.

GREAT MILLET—CHOLUM, JOWAR.			LESSER MILLET—RAGI OR MURWA AND CHEENA.			MAIZE OR INDIAN-CORN.			GRAM.			FIREWOOD.			SALT.			MARTS.
Present return.	Next preceding return.	Corresponding return of last year.	Present return.	Next preceding return.	Corresponding return of last year.	Present return.	Next preceding return.	Corresponding return of last year.	Present return.	Next preceding return.	Corresponding return of last year.	Present return.	Next preceding return.	Corresponding return of last year.	Present return.	Next preceding return.	Corresponding return of last year.	
R. A. P.	R. A. P.	R. A. P.	R. A. P.	R. A. P.	R. A. P.	R. A. P.	R. A. P.	R. A. P.	R. A. P	R. A. P.	R. A. P.	R. A. P.	R. A. P.	R. A. P.	R. A. P.	R. A. P.	R. A. P.	
1 8 0	1 8 0	1 8 0	...	...	...	1 0 0	1 0 0	1 4 0	1 8 0	1 10 0	2 0 0	0 6 3	0 6 3	0 6 3	4 0 0	4 0 0	4 0 0	Calcutta.
...	...	...	...	...	...	...	...	...	2 4 0	...	2 4 0	...	...	...	4 4 0	...	4 4 0	Serajgunge.
...	...	...	...	...	...	...	...	...	1 10 0	1 13 0	2 3 0	0 5 0	0 5 0	0 5 0	4 0 0	4 0 0	4 0 0	Dacca.
...	...	...	...	...	...	...	...	...	1 14 0	1 12 0	2 4 0	0 8 0	0 8 0	0 8 0	3 12 0	3 12 0	4 0 0	Naraingunge.
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	Chittagong.
...	...	...	...	...	...	1 0 0	1 0 0	1 2 0	1 0 5	1 0 5	1 6 9	0 5 0	0 5 6	0 6 3	4 0 9	4 0 9	4 3 0	Patna.
...	...	...	...	...	...	...	...	...	2 8 0	2 3 0	3 4 0	0 5 0	0 5 0	0 9 0	3 12 0	3 12 0	4 6 0	Balasore.
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	Pooree.
...	...	...	1 11 0	1 11 0	2 5 0	...	...	...	1 . 9 0	1 9 0	1 14 0	0 4 0	0 4 0	0 4 0	3 12 0	3 12 0	3 3 0	Cuttack.

Published for general information.

COLMAN MACAULAY,
Offg. Secy. to the Govt. of Bengal.

STATEMENT SHOWING THE STOCKS OF RICE IN AND AROUND CALCUTTA.

NAMES OF MARTS.	STOCKS IN HAND AS COMPILED ON—												
	1st week of Nov. 1880.	1st week of Dec. 1880.	1st week of Jan. 1881.	1st week of Feb. 1881.	1st week of Mar. 1881.	1st week of April 1881.	1st week of May 1881.	1st week of June 1881.	1st week of July 1881.	1st week of Aug. 1881.	1st week of Sept. 1881.	2nd week of Oct. 1881.	1st week of Nov. 1881.
	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.
Baliaghatta	3,06,000	2,36,000	2,56,700	4,13,000	3,92,000	3,90,000	3,98,500	4,15,000	3,78,000	3,19,300	2,83,600	3,10,000	2,48,000
Ooltadanga	49,500	47,000	54,500	43,500	58,900	71,900	69,700	67,800	69,200	61,200	59,200	47,300	41,400
Chitpore, Golabaree, Coomertooly, Hatkhola, and Culpy Ghât.	6,12,000	4,45,700	6,82,500	5,61,700	5,82,800	6,96,000	6,67,300	6,40,700	6,18,700	6,29,800	6,29,400	5,85,400	7,45,300
Pathuriaghatta, Posta, and Jorabagan.	29,000	21,500	37,000	34,500	40,000	37,500	37,000	35,000	29,500	28,500	24,000	29,000	35,700
Tollygunge, Chitlab, Kidderpore, and Moonshigunge.	90,700	51,200	1,01,100	1,18,200	1,39,100	1,26,300	1,20,500	1,18,400	1,12,300	1,52,000	1,52,900	1,23,900	95,400
21 Minor Bazars (estimated) ...	2,40,000	2,40,000	2,40,000	2,40,000	2,40,000	2,40,000	2,40,000	2,40,000	2,40,000	2,40,000	2,40,000	2,40,000	2,40,000
Other retail shops, 3,129 in number (estimated).	2,50,000	2,50,000	2,50,000	2,50,000	2,50,000	2,50,000	2,50,000	2,50,000	2,50,000	2,50,000	2,50,000	2,50,000	2,50,000
Boidyabatty, Nowabgunge, Bhuddressur, and Chandernagore.	1,03,826	1,18,098	1,09,875	77,200	87,677	64,200	50,453	32,119	36,094	86,100	68,400	65,156	42,700
Total ...	16,81,026	14,09,498	17,31,675	17,38,100	17,90,477	18,75,900	18,33,453	17,99,019	17,33,794	17,66,900	17,07,500	16,50,756	16,98,500
On Railway premises on both sides of the river.	1,340 (on 4th Nov. 80.)	1,596 (on 3rd Dec. 80.)	7,568 (on 3rd Jan. 81.)	4,710 (on 2nd Feb. 81.)	1,286 (on 3rd Mar. 81.)	4,612 (on 4th April 81.)	3,342 (on 4th May 81.)	780 (on 3rd June 81.)	1,060 (on 5th July 81.)	......	1,374 (on 3rd Sept. 81.)	2,858 (on 15th Oct. 81.)	800 (on 5th Nov. 81.)
On boats unloaded ... By Port Commissioners' returns.	19,491 (1st to 3rd Nov. 80.)	31,841 (1st to 3rd Dec. 80.)	59,286 (1st to 3rd Jan. 81.)	68,985 (31st Jan. to 2nd Feb. 81.)	53,125 (1st to 3rd Mar. 81.)	49,887 (1st to 3rd April 81.)	20,115 (1st to 3rd May 81.)	19,283 (1st to 3rd June 81.)	22,317 (3rd to 5th July 81.)	48,546 (1st to 3rd Aug. 81.)	37,825 (1st to 3rd Sept. 81).	37,198 (13th to 15th Otc. 81.)	13,895 (4th to 6th Nov. 81.)
By Canal returns	26,466 (1st to 3rd Nov. 80.)	20,673 (1st to 3rd Dec. 80.)	1,03,384 (1st to 3rd Jan. 81.)	1,68,010 (31st Jan. to 2nd Feb. 81.)	1,37,039 (1st to 3rd Mar. 81.)	62,534 (1st to 3rd April 81.)	59,567 (1st to 3rd May 81.)	52,163 (1st to 3rd June 81.)	49,359 (3rd to 5th July 81.)	53,643 (1st to 3rd Aug. 81.)	60,078 (1st to 3rd Sept. 81.)	49,031 (13th to 15th Oct. 81.)	35,824 (4th to 6th Nov. 81.)
Grand Total of Stocks ...	17,28,323	14,63,608	19,01,913	19,79,805	19,81,927	19,92,933	19,16,477	18,71,245	18,06,530	18,69,089	18,06,777	17,39,843	17,49,019
Probable stocks available for exportation by sea.	6½ lakhs.	4 lakhs.	8½ lakhs.	9¼ lakhs.	9½ lakhs.	9½ lakhs.	8¾ lakhs.	8½ lakhs.	7½ lakhs.	8 lakhs.	7½ lakhs.	7 lakhs.	7 lakhs.

STATISTICAL DEPARTMENT,
The 7th November 1881.

COLMAN MACAULAY,
Offg. Secy. to the Govt. of Bengal.

Results of the Meteorological Observations taken at the Alipore Observatory from 30th October to 5th November 1881.

Month.	Date.	Maximum in sun.	Mean pressure barometer at 32° Fahr.	Temperature.				Hygrometry.				Wind.		Rain.	Weather.
				Mean.	Maximum.	Range.	Minimum.	Mean wet bulb.	Vapour tension.	Dew point.	Humidity.	Prevailing direction.	Miles recorded.		
1881.		⊖	Inches.	⊖	⊖	⊖	⊖	⊖	Inches	⊖	%			Inches	
Oct.	30th	142·9	29·919	76·1	85·6	17·5	68·1	70·5	0·668	67·2	76	Calm and variable ...	17	Nil	Partially cloudy, ⌓.
„	31st	145·0	·906	76·1	85·3	15·2	70·1	70·8	·686	68·0	78	Calm and NE ...	16	„	Partially cloudy, ≡, ⌓.
Nov.	1st	142·8	·935	76·3	84·3	15·0	69·3	69·9	·648	66·3	73	Calm and NNE ...	42	„	Chiefly clear, ⌓.
„	2nd	144·9	·917	75·9	83·8	16·4	67·4	68·9	·613	64·7	70	Calm and NNE ...	58	„	Clear, ⌓.
„	3rd	139·5	·870	74·0	83·1	15·6	67·5	65·6	·518	59·9	64	Calm and NNW ...	56	„	Chiefly clear, ⌓.
„	4th	139·4	·895	72·9	83·4	19·9	63·5	66·0	·549	61·6	70	Calm and NW ...	12	„	Clear, ≡, ⌓.
„	5th	140·8	·968	73·9	84·1	19·9	64·2	66·3	·546	61·4	68	Calm and NE ...	43	„	Partially cloudy, ≡, ⌓.

	Inches.
The mean pressure of the seven days	29·916
The average pressure of the corresponding period for 24 years, S. G. Office ...	29·912
	⊖
The mean temperature of the seven days	75·0
The average temperature of the corresponding period for 24 years, S. G. Office ...	78·5
The extreme variation of temperature during the seven days	22·1
The maximum temperature during the seven days	85·6
	Miles.
The highest velocity of the wind in one hour during the seven days	13
	lb.
The highest pressure of the wind on one square foot during the seven days ...	2·5
	%
The mean relative humidity during the seven days	71
The average relative humidity of the corresponding period for 24 years, S. G. Office ...	74
	Inches.
The total fall of rain from 30th October to 5th November 1881	Nil
The average fall of the corresponding period for 24 years, S. G. Office	0·38
The total fall from 1st January to 5th November 1881	69·22
The average fall of the corresponding period for 24 years, S. G. Office	64·73

The mean pressure, temperature, &c., are deduced from the traces of the barograph and thermograph.

The maximum and minimum temperatures are obtained from self-registering thermometers. All the thermometers are verified, and the readings have been corrected to a standard constructed and verified at the Kew Observatory. They are exposed under a thatched shed open at the sides, and are suspended four feet above the ground.

The barometer readings are corrected approximately to those of the standard Newman's No. 86, formerly at the Surveyor-General's Office.

The hygrometric elements are obtained from Tables III, IV, and V of the official tables computed in the Meteorological Office, and based on Regnault's modifications of August's formula.

The direction of the movement of the wind are taken from the trace of a Beckley's anemograph.

The mouth of the rain-gauge is one foot above the ground.

≡ fog, ⌓ dew.

JOHN ELIOT,
for Meteorological Reporter to the Government of India.

METEOROLOGICAL OFFICE, INDIA,
The 7th November 1881.

Abstract of the results of Meteorological Observations taken at the Alipore Observatory in the month of October 1881.

	Inches.	Date.	Hour.
The mean pressure of the month	29·811		
The average pressure of 24 years	29·832		
The highest pressure during the month	29·996	25th	10h.
The lowest pressure during the month	29·613	6th	16h.
The range of pressure during the month	0·383		
	°		
The mean temperature during the month	79·7		
The average temperature of 24 years	81·5		
The highest temperature during the month	90·4	3rd	
The lowest temperature during the month	67·5	25th	
The range of temperature during the month	22·9		
The mean daily range of temperature during the month	13·4		
The greatest range of temperature in one day during the month	18·4	26th	
	Per cent.		
The mean humidity during the month	82		
The average humidity of 24 years	79		
	Inches.		
The mean vapour tension during the month	0·827		
The average vapour tension of 9 years	0·854		
The mean cloud proportion of the month	3·37		
The total rainfall of the month	1·50		
The total rainfall of the month indicated by a Beckley's self-registering rain-gauge (mouth of the gauge 50·5 feet high)	1·40		
The average fall of 48 years	5·61		
The greatest fall in 24 hours	0·46	4th	
	Days.		
The number of rainy days in the month	8		
The average number of rainy days of 24 years	10		
	°		
The mean maximum equilibrium temperature of solar radiation of the month	144·6		
The mean difference of sun and air temperatures	57·6		
The greatest sun temperature	153·0	2nd	
The greatest excess of sun over air temperature	65·7	11th	
The mean temperature of nocturnal radiation thermometer on woollen cloth	67·9		
The mean depression of nocturnal radiation thermometer below the minimum of air	5·7		
The greatest depression of nocturnal radiation thermometer below the minimum of air	9·5	25th	
	Miles.		
The mean movement of the wind per day	44·5		
The greatest movement of the wind in one day	149·0	8th	
The greatest movement of the wind in one hour	13·0	8th noon to 1 P.M.	

The number of hours under each of the 8 points—

N. 83, NE. 30, E. 77, SE. 53, S. 53, SW. 24, W. 24, NW. 37, Calm 363.

The results of observations at the Alipore Observatory are not rigorously comparable with the registers of past years (at the Park-street Observatory). The barometer is about 3 feet higher at Alipore, and, other things being equal, reads therefore ·003 lower. The diurnal range of temperature is also greater at Alipore, and the mean temperature apparently about 2·5° lower; and finally, the thermometer, which has furnished the record of temperature at the Surveyor-General's Office during the last 20 years and upwards, is found to read 0·6 higher than the Kew standard thermometer, which is the standard of reference at the present Observatory.

JOHN ELIOT,

METEOROLOGICAL OFFICE, INDIA, *The 7th November* 1881.

for Meteorological Reporter to the Govt. of India.

Results of the Thermometrical Observations taken at the Meteorological Office, Chowringhee, from 30th October to 5th November 1881.

Month.	Date.	Temperature. Mean.	Temperature. Maximum.	Temperature. Range.	Temperature. Minimum.	Hygrometry. Vapour tension.	Hygrometry. Dew point.	Hygrometry. Humidity.	Rain.
1881.		°	°	°	°	Inches.	°	%	Inches.
October	30th ...	76·3	87·8	17·5	70 3	·661	66·9	71	Nil
"	31st ...	77·6	85·2	14·2	71·0	·667	67·2	70	
November	1st ...	77·6	85·8	16·3	69·5	·604	64·3	65	
"	2nd ...	76·8	85·3	16·6	68·7	·599	64·0	65	
"	3rd ...	75·3	84·8	18·4	66·4	·523	60·2	61	
"	4th ...	74·8	85·3	20·4	64·9	·508	59·4	59	
"	5th ...	75·2	85·8	19·9	65·9	·464	56·8	56	

	°
The mean temperature of the seven days	76·2
The extreme variation of temperature during the seven days	22·9
The maximum temperature during the seven days	87·8
	%
The mean relative humidity during the seven days	64
The total fall of rain from 30th October to 5th November 1881 ...	Nil.

METEOROLOGICAL OFFICE, INDIA,
The 7th November 1881.

JOHN ELIOT,
for Meteorological Reporter to the Govt. of India.

Abstract of the results of Thermometrical Observations taken at the Meteorological Office, Chowringhee, in the month of October 1881.

	°	Date.
The mean temperature during the month	80·4	
The highest temperature during the month	91·8	3rd
The lowest temperature during the month	68·8	25th & 2 th
The range of temperature during the month	23·0	
The mean daily range of temperature during the month ...	13·7	
The greatest range of temperature in one day during the month ...	18·2	25th
	%	
The mean humidity during the month	76	
	Inches.	
The mean vapour tension during the month	80·2	
The total rainfall of the month	1·41	
The greatest fall in 24 hours	0·43	4th
The number of rainy days in the month	7 days.	

JOHN ELIOT,
for Meteorological Reporter to the Govt. of India.

METEOROLOGICAL OFFICE, INDIA,
The 7th November 1881.

Weekly Return of Traffic Receipts on Indian Railways.

EAST INDIAN RAILWAY.

Approximate Return of Traffic for week ended 29th October 1881 *on* 1,504¼ *miles open.*

	COACHING TRAFFIC.		MERCHANDISE AND MINERAL TRAFFIC.		Other earnings (estimated).	Total earnings.	TRAFFIC TRAIN-MILES RUN.		
	Number of passengers.	Coaching receipts.	Weight carried.	Receipts.			Coaching.	Merchandise.	Total.
		Rs. A. P.	Mds. s.	Rs. A. P.	Rs. A. P.	Rs. A. P.			
Total traffic for the week ...	155,077	2,52,268 11 9	17,02,625 0	5,41,102 4 0	17,200 9 8	8,10,571 9 5	51,109½	104,835½	155,944¾
Or per mile of railway	......	167 11 3	......	359 11 5	11 7 0	538 13 8	......	......	......
For previous 16 weeks of half-year	2,500,838	32,49,982 7 0	2,96,79,509 10	92,74,792 0 7	1,89,235 4 10	1,27,14,009 12 5	784,735¼	1,825,098½	2,609,833¾
Total for 17 weeks ...	2,655,915	35,02,251 2 9	3,13,82,134 10	98,15,894 4 7	2,06,435 14 6	1,35,24,581 5 10	835,844½	1,929,934	2,765,778½
COMPARISON.									
Total for corresponding week of previous year	155,774	2,74,171 5 5	16,05,355 0	5,85,615 3 6	18,617 7 9	8,78,404 0 8	53,801	108,396	[illegible]
Per mile of railway corresponding week of previous year ...	......	181 14 5	......	388 8 6	12 5 8	582 12 7	......	......	......
Total to corresponding date of previous year	2,533,518	34,89,438 4 1	2,58,27,590 30	76,44,811 7 6	2,78,213 12 8	1,14,12,463 8 3	849,994	1,449,866	2,299,860

EASTERN BENGAL RAILWAY.

Approximate Return of Traffic for week ended 22nd October 1881 *on* 171¾ *miles open.*

	COACHING TRAFFIC.		MERCHANDISE AND MINERAL TRAFFIC.		Other earnings (estimated).	Total earnings.	TOTAL TRAIN-MILES RUN.		
	Number of passengers.	Coaching receipts.	Weight carried.	Receipts.			Coaching.	Merchandise.	Total.
		Rs. A. P.	Mds. s.	Rs. A. P.	Rs. A. P.	Rs. A. P.			
Total traffic for the week ...	37,992	28,220 0 0	3,52,390 0	1,13,560 0 0*	900 0 0	1,42,680 0 0	5,766½	11,548¾	17,315¼
Or per mile of railway	221	164 4 11	2,051 30	661 3 1	5 3 10	830 11 10	......	......	......
For previous 16 weeks of half-year	648,517½	4,11,640 0 0	49,45,852 0	16,71,637 0 0	8,808 0 0	20,92,085 0 0	88,624¼	173,509½	262,133¾
Total for 17 weeks ...	686,509½	4,39,860 0 0	52,98,242 0	17,85,197 0 0	9,708 0 0	22,34,765 0 0	94,390¾	185,058¼	279,449
COMPARISON.									
Total for corresponding week of previous year	37,901½	25,089 0 0	1,99,944 0	57,899 0 0	136 0 0	83,124 0 0	6,044½	6,866½	12,911
Per mile of railway corresponding week of previous year ...	221	146 1 3	1,164 6	337 1 9	0 12 8	483 15 8	......	......	......
Total to corresponding date of previous year	614,390½	3,88,248 0 0	44,19,090 0	14,20,954 0 0	7,212 0 0	18,16,414 0 0	94,369¾	157,294¼	251,664

* Rs. 396 included on account carriage of Revenue stores.

EASTERN BENGAL RAILWAY.

Approximate Return of Traffic for week ended 29th October 1881 *on* 171¾ *miles open.*

		Rs. A. P.	Mds. s.	Rs. A. P.	Rs. A. P.	Rs. A. P.			
Total traffic for the week ...	31,387	28,532 0 0	3,68,767 0	1,18,733 0 0*	229 0 0	1,47,494 0 0	5,807	11,365½	17,172½
Or per mile of railway	183	166 2 0	2,147 5	691 5 0	1 5 4	858 12 4	......	......	......
For previous 17 weeks of half-year	686,509½	4,39,860 0 0	52,98,242 0	17,85,197 0 0	9,708 0 0	22,34,765 0 0	94,390¾	185,058¼	279,449
Total for 18 weeks ...	717,896½	4,68,392 0 0	56,67,009 0	19,03,930 0 0	9,937 0 0	23,82,259 0 0	100,197¾	196,423¾	296,621½
COMPARISON.									
Total for corresponding week of previous year	49,750½	31,721 0 0	2,70,063 0	78,004 0 0	445 0 0	1,10,170 0 0	5,715½	7,973	13,688½
Per mile of railway corresponding week of previous year ...	290	184 11 1	1,572 17	454 2 9	2 9 6	641 7 4	......	......	......
Total to corresponding date of previous year	664,141	4,12,969 0 0	46,89,153 0	14,98,958 0 0	7,657 0 0	19,26,584 0 0	100,085¾	165,267¼	265,352½

* Rs. 210 included on account carriage of Revenue stores.

BENGAL PROVINCIAL RAILWAYS.

Weekly Statement of Traffic Receipts.

No. 36.

Latest return received.	Name of Railway.	Length open.	RECEIPTS FOR WEEK ENDING		TOTAL RECEIPTS FROM 1ST JANUARY		Total increase in 1881.	Total decrease in 1881.	Percentage of increase or decrease.
			18th Sept. 1880.	17th Sept. 1881.	To 18th Sept. 1880.	To 17th Sept. 1881.			
1881.		Miles.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	
1st October ...	Northern Bengal	230	32,346 0 0	34,740 0 0	10,84,160 0 0	11,58,990 0 0	1,10,830 0 0	......	+11
24th September ...	Tirhoot ...	82	9,392 0 0	7,381 0 0	3,82,883 0 0	4,05,755 0 0	22,872 0 0	......	+6
24th ditto ...	Patna-Gya ...	57	22,295 0 0	15,722 0 0	3,13,733 0 0	3,49,544 0 0	35,811 0 0	......	+11
15th October ...	Calcutta and South-Eastern.	28	1,771 0 0	1,854 0 0	1,01,273 0 0	1,10,101 0 0	8,828 0 0	......	+9
4th September ...	Nalhati ...	27½	1,251 0 0	1,250 0 0	52,737 0 0	47,105 0 0	......	5,632 0 0	−11
	Total ...	424½	67,055 0 0	60,947 0 0	18,98,786 0 0	20,71,495 0 0	1,72,709 0 0	......	+9

BENGAL PROVINCIAL RAILWAYS.

Weekly Statement of Traffic Receipts.

No. 37.

Latest return received.	Name of Railway.	Length open.	Receipts for Week ending						Total Receipts from 1st January						Total increase in 1881.			Total decrease in 1881.	Percentage of increase or decrease.
			25th September 1880.			24th September 1881.			To 25th September 1880.			To 24th September 1881.							
1881.		Miles.	Rs.	A.	P.	Rs.	A.	P.	Rs.	A.	P.	Rs.	A.	P.	Rs.	A.	P.	Rs.	
1st October ...	Northern Bengal ...	230	37,882	0	0	38,142	0	0	10,86,042	0	0	11,97,133	0	0	1,11,090	0	0	......	+12
24th September...	Tirhoot	82	9,184	0	0	10,195	0	0	3,92,067	0	0	4,15,950	0	0	23,883	0	0	......	+6
24th ditto ...	Patna-Gya ...	57	17,056	0	0	22,360	0	0	3,30,789	0	0	3,71,904	0	0	41,115	0	0	......	+12
15th October ..	Calcutta and South-Eastern	28	4,112	0	0	3,716	0	0	1,05,385	0	0	1,13,817	0	0	8,432	0	0	......	+8
24th September...	Nalhati	27¼	1,257	0	0	1,316	0	0	53,994	0	0	48,421	0	0	......			5,573	−10
	Total ...	424¼	69,491	0	0	75,729	0	0	19,68,277	0	0	21,47,224	0	0	1,78,947	0	0	......	+9

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SUPPLEMENT TO

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WEDNESDAY, NOVEMBER 16, 1881.

OFFICIAL PAPERS.

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RESOLUTION ON THE ANNUAL REPORT ON INLAND EMIGRATION FOR THE YEAR 1880-81.

GENERAL DEPARTMENT—INLAND EMIGRATION.

Calcutta, the 14th November 1881.

RESOLUTION.

READ—

The Annual Report on Inland Emigration for the year 1880-81.

The report which is submitted by Dr. Grant who was Superintendent of Emigration throughout the year has again not reached Government till considerably after the due date. The report gives a full and interesting account of Inland emigration throughout the year. The first portion of it deals as usual with the administrative changes effected or discussed during the period under review, while the remainder consists of an analysis of the work done by the department. The object of all the changes which have, for some time past, been made has been to facilitate, as far as possible, emigration to the tea districts by reducing the difficulties and consequent expense of conveying labourers from their homes. This it has been sought to effect by shortening the journey to Assam, and by freeing both parties to the contract from all restrictions not absolutely needed in the interest of the labourer himself or of the general public. In order to lessen the cost of the labourer to the planter, the rule regarding the space to be allotted on board inland steamers to each emigrant was modified during the year in consideration of a reduction in the fares charged by the Steamer Companies and of a promise by the

India General Steam Navigation Company to perform the journey from Dhubri to Tezpore and Dibrugurh in the quickest time possible under the circumstances. A further concession was at the same time made to the Steamer Companies whereby steamers are now enabled to carry the full legal complement of 200 emigrants without providing a medical officer. These changes, which were introduced with the concurrence of the Chief Commissioner of Assam, have worked very satisfactorily as have also the new rules, permitting on the one hand lads of 16 years of age to enter into contracts, and on the other hand restricting the powers of agents to transfer labourers from one garden to another. Shortly before the close of the year certain alterations were also made in the rules regarding the fittings and licensing of emigrant vessels and the supply of medical comforts and attendance—the working of which will be more fully noticed next year. Finally, in order to render the journey shorter, further improvements have been made in the route between Kaunia and Dhubri; while the route *viâ* Rajmahal which had ceased to be used by labourers was finally closed and the sheds were dismantled.

2. The principal matter affecting emigration during the year has, however, been the proposed amendment of the Labour Transport Act of 1873. The insufficient encouragement given by that Act to free emigration, the restrictions which it imposes upon recruiting by sirdars or headmen, the absence from it of provision for the enforcement of contracts with labourers other than those entered into under its terms, and the inadequate protection afforded by it to the planter against misconduct on the part of his labourers, have for some time been urged upon Government as matters in respect of which a change in the law was required. A Committee was accordingly appointed to "examine into the working of the Act and to suggest any relaxations and amendments of the law which it might seem safe and advisable to adopt." Most of the essential recommendations of that Committee have been embodied by the Government of India in the Bill which has recently been published in the Gazette and is now before the Legislative Council. Except on one or two points, the Bill has the entire approval of the Government of Bengal; and the Lieutenant-Governor hopes that the few suggestions which he has made to the Government of India in favour of a somewhat closer adherence to the proposals of the Committee on those points may yet be accepted. Whatever may be the decision arrived at by the Supreme Government on this subject, Sir Ashley Eden has no doubt that the Bill when passed will effect a vast and much needed improvement in the present law, and that under its provisions immigration into the tea districts will be conducted with less friction, difficulty, expense and delay than has hitherto been possible.

3. The Superintendent reported last year that the number of contractors holding licenses at the close of that year was ten. This does not tally exactly with the present report, which shows eleven contractors throughout the year—a discrepancy which is probably due to a contractor having resumed an agency which he was supposed to have permanently resigned. No fresh licenses were granted during the year. More than half the existing contractors are still general contractors who supply any garden which may require labour; but a large decrease in the number of these agents has taken place in recent years owing, the Superintendent believes, partly to the reduced demand for their services and partly to his having discouraged applications for general licenses. It is, as Dr. Grant states, obviously desirable that contractors should be few, and should be responsible agents.

4. The number of licenses issued to recruiters fell from 618 in 1879-80 to 506 in the year under review, owing no doubt to the diminished demand for labour. It is gratifying to observe that ten licenses only were cancelled for misconduct.

5. An increase from 2,207 to 2,635 is apparent in the number of certificates granted by employers to garden sirdars. Of these, 214 against 1,897 in the previous year were authorized to collect C class labourers only, *i.e.*, their operations were restricted to the recruitment of batches not exceeding 20 in number. Four certificates granted to sirdars of this class were cancelled. No case of misconduct among sirdars collecting larger numbers came to notice.

6. The following statement shows the extent of the falling off which has taken place in the number of emigrants recruited during the last three years exclusive of coolies registered for Dhubri only :—

	1878-79.	1879-80.	1880-81.
Class A (Contractors' recruits)	13,795	7,601	5,168
„ B (recruited by sirdars, and passed through depôt)	11,917	4,625	1,543
„ C (recruited by sirdars in batches of under twenty)	2,439	1,324	923
Total ...	28,151	13,550	7,634

Of the total number despatched during the year under review 5,939 went through Calcutta depôts, 772 through Goalundo depôts, and the remainder were embarked at Kooshtea or Goalundo without passing through depôts. The causes assigned for the diminution last year have been at work throughout the period under review. The fall in the price of tea in 1879-80 led no doubt to reductions in garden establishments; but the main reason for the falling off has been the prevalence of good harvests for the last three years and the consequent unwillingness to emigrate among the inhabitants of the districts in which recruitment was formerly most successful.

7. The change which has taken place within the last four years in the proportion of the total labour supply drawn from different localities is very remarkable. The following table illustrates this change :—

	1877-78.	1878-79.	1879-80.	1880-81.
Chota Nagpore	48·58	65·35	44·47	29·62
Sonthal Pergunnahs	3·87	3·18	2·94	1·78
Bengal Proper	23·08	14·66	19·75	43·81
Behar	24·86	15·56	14·41	22·98
Orissa	0·15	0·02	0·08	1·78
North-Western Provinces	0·86	0·39	0·06	......

The results for the present year fully bear out the conclusions expressed last year that Chota Nagpore is almost exhausted as a recruiting ground; and that managers of gardens must for the future look to up-country labour to supply their requirements. In respect, however, to the proportion of labour recruited in Bengal and Behar respectively the above statement is somewhat misleading. The whole of the emigrants recruited in Bengal were enlisted in the districts of the Presidency and Burdwan Divisions and nearly half of them in the Burdwan district alone. The remainder were engaged chiefly in Calcutta and its neighbourhood. It is known that there is scarcely any emigration among the inhabitants of these divisions, and that nearly the whole of the emigrants registered in them are men who have come down from Behar and the North-Western Provinces in search of employment. If these emigrants were shown according to their place of residence, and not according to that of recruitment, there is reason to believe that the respective results now shown for Bengal and Behar would be reversed. Dr. Grant submits a table and map illustrative of the extent to which in his opinion the chief recruiting grounds supply emigrant labour to the colonies and to the tea districts respectively. But as neither the map nor table shows any emigration to the tea districts from the North-Western Provinces or Oudh, it is manifest that the same error vitiates the figures that has been noticed in regard to the percentage against Bengal Proper in the table reproduced above.

8. Regarding the route followed by emigrants to the tea districts the most remarkable points are the abandonment of the old Rajmahal route, and the increasing popularity of the journey by Dhubri as compared with that by Goalundo and Khoostea. The number of labourers for Assam embarking at Goalundo was 3,294 or about half of that for the previous year; while it was exceeded by the embarkations at Dhubri, which numbered 7,366. Altogether 5,939 labourers were registered for transmission through Calcutta depôts, of whom 5,683 arrived in Calcutta, the reduction having been effected by 134 detentions and 122 casualties. The apparently large

number of detentions is explained by the fact that one batch of 78 emigrants under class B who were registered just at the close of the year were not despatched until the commencement of the present year and have therefore been shown as detained. The casualties before arrival in depôt amounted to 2·02 per cent. on the whole number of labourers registered and consisted of ten discharges and 54 desertions from mofussil depôts and of 48 desertions and one death on the way to Calcutta. Nineteen labourers also are stated to have been left behind. The absence of mortality is gratifying and the small percentage of desertions may reasonably be regarded as an indication of good treatment of the labourers by recruiters and sirdars.

9. From a table given by the Superintendent it appears that of the 6,001 persons accommodated in the Calcutta depôts during the year, including a balance of 308 remaining undisposed of from the previous year, 360 persons were rejected (of whom 325 were emigrants and 35 dependants), 196 were discharged, 225 deserted, 8 died, and 215 remained in depôt at the close of the year. The manner in which the remainder were forwarded to their destinations has already been shown. The percentage of persons rejected to those brought to depôt was 6·30 among recruiter's and 4·61 among B class labourers. As is generally the case, least care would seem to be exercised by the servants of those contractors whose business is most extensive and the percentage of rejections was largest in the largest agencies. Discharges from depôt amounted to 3·38 per cent. on the A class to 2·71 on the B class. Desertions were confined to recruiter's men among whom they amounted to 4·59 per cent. Of the deaths 7 took place among A class labourers but in no depôt did the mortality rise above 0·24 per cent. This most satisfactory result is due to the complete absence of cholera from the depôts throughout the year. The year as pointed out by Dr. Grant was a favourable one throughout Bengal in respect of this disease; at the same time the absolute immunity of the depôts from it, when considered in connection with the trifling mortality from other causes, indicates the greater care bestowed upon the sanitary condition of the depôts by the Medical Inspector and the greater attention given to the subject by the contractors themselves. The Lieutenant-Governor trusts that, now that so favourable a result has been attained, every effort will be made to maintain the improvement which has been effected. The percentage of rejections is, except in the case of B class emigrants, somewhat lower than has been the case in previous years owing, it is believed, to the greater strictness now observed in mofussil inspections. It is gratifying that no further complaints have reached the Lieutenant-Governor as to the superficial character of the examination at the depôt which formed the subject of correspondence last year. Finally, the results of the year's work in the Goalundo depôts are very satisfactory, the percentage of deaths being only ·12; while out of 5,674 emigrants passing through these depôts the total casualties—from deaths, desertions, releases and rejections—were only 45 or ·80 per cent. There were no casualties among the 55 emigrants shipped to Chittagong.

10. The almost entire absence of cholera, and the entire absence of mortality from this cause, are the most gratifying features in connection with the conveyance of labourers to Assam on board the river steamers. A slight outbreak occurred in April 1880 among a batch of emigrants shipped on board the *Rajmahal* from Dhubri, but no case was fatal. Throughout the year three deaths only occurred on board steamers, the average mortality being 0·09 per cent. on the whole number embarked against 1·05 per cent. in 1879-80 and 2·78 in the previous year. In all 66 trips were made by 15 steamers—the average duration of each trip from Goalundo to Dibrugurh (15 days and 9 hours) showing a slight improvement as compared with previous years. In this respect the timing of the steamers of the River Steam Navigation Company is somewhat better than that of the India General Steam Navigation Company. The Lieutenant-Governor understands that the question of a light line of despatch steamers on the Brahmaputra is again under consideration, and he trusts that it may before long be found possible to supply that greatest want of the Assam tea districts—a quick and certain steamer service.

11. Emigration to the tea districts of the Surma valley from Goalundo was confined to A and B class. The total number of emigrants embarked for Cachar by this route was 1,257 and of dependents 577—and shows a falling off of 1,165 persons as compared with the previous year. The casualties during the journey amounted to 14 desertions and 51 deaths, of which no less than 34 were from cholera. Embarkations to Sylhet were 432 only, of whom about one-fourth were dependents. Four desertions and three deaths occurred. There was no case of cholera on board the Sylhet country boats. The only possible system of transport to these districts at present is by country boat; and with such a system complete prevention of cholera is not always practicable. In the interests of tea in the Surma valley and of the emigrants themselves it is earnestly to be hoped that the connection of Sylhet with the railway system of Bengal may not be far distant. The results of the conveyance of C class labourers to these districts would seem from the returns given by the Superintendent to be favourable.

12. The following summary of the transport arrangements for the whole year is reproduced from the report:—

CLASS.		Number registered.	Born on the journey.	Balance of previous year.	Total.	Total deductions on account of all causes.	Percentage.	Routes by which forwarded.	Total number landed at destination.		Balance in depôt at the close of the year.
Originally transmitted through Calcutta depôts	A ...	4,900	...	231	5,131	928	...	Goalundo ...	2,964 700 160	Assam ... Cachar ... Sylhet ...	238
								Calcutta ...	57	Chittagong ...	
								Dhubri ...	84	Assam ...	
	B ...	1,039	...	240	1,279	231	...	Goalundo ...	319 490 67	Assam ... Cachar ... Sylhet ...	40
								Dhubri ...	132	Assam ...	
Originally transmitted through Goalundo depôts	A ...	268	...	8	276	22	...	Goalundo ...	216 38	Cachar ... Sylhet ...	......
	B ..	504	...	29	533	40	...		327 160	Cachar ... Sylhet ...	6
Proceeding independently of depôts	C ...	923	...	......	923	17	...	Kooshtea ... or	527	Cachar ...	......
								Other routes...	379	Sylhet ...	
Total ...		7,634	...	508	8,142	1,238	...	......	6,620	......	284

13. The thanks of Government are again due to Dr. Grant for the care and energy which he has shown in the administration of the Department. The Medical Inspectors, Drs. Chandra, Richards, and Prockter, by whom his efforts for the improvements of emigration have been well seconded, are also entitled to the acknowledgments of Government.

By order of the Lieutenant-Governor of Bengal,

A. P. MACDONNELL,

Offg. Secretary to the Government of Bengal.

RESOLUTION ON THE REPORT OF THE PROTECTOR OF EMIGRANTS UPON COLONIAL EMIGRATION FOR THE YEAR 1880.

GENERAL DEPARTMENT—COLONIAL EMIGRATION.
Calcutta, 15*th the November* 1881.

RESOLUTION.

READ—

The Report of the Protector of Emigrants upon Colonial Emigration for the year 1880.

The report is submitted by Dr. Grant, who was Protector of Emigrants throughout the year.

2. The most important administrative measure of the year was the restoration of the original rule which provided that the proportion of females to males shipped on board each vessel should not be less than 40 to 100. In the year 1877 an attempt was made to reduce the mortality among infants and children during the passage down the Bay of Bengal in the face of the monsoon, by substituting for this rule certain provisions under which the proportion of women carried should increase as the season advanced. Great inconvenience resulted from the change, and a reversion to the former rule was ordered by the Government of India with effect from the 1st August 1880. Afterwards, some difficulty having been experienced in complying exactly with the restored rule, it was relaxed in a few cases, and in one case the relaxation took the form of allowing the requisite proportion of the sexes to be made up in the following year's shipments. The Government of India, however, have now ordered that the terms of the rule shall only be relaxed under very special circumstances, and that in no case whatever shall an excess of women in one season be allowed to compensate for a deficiency in another. When the prescribed proportion for the season cannot be made up before its close, it must be adjusted by a reduction in the number of male emigrants. The attention of the Colonies receiving Indian immigrants has been called to the necessity for making provision for disabled pauper coolies returning to India who are unable to earn a livelihood for themselves, and it is understood that all the Governments concerned are anxious to treat such cases liberally. Similar representations have been made to the French and Dutch Governments with respect to their colonies.

3. The St. Vincent Emigration Agency, which was re-opened in the previous year, was again closed during that under review. Emigration for Fiji was suspended, but the Natal Agency was re-opened at the end of April. Agencies were at work throughout the year for the British Colonies of Mauritius, Demerara, Trinidad, Jamaica, St. Lucia and Natal, and for the French and Dutch Colonies of Guadeloupe and Surinam. The Protector acknowledges the assistance which he has received from all Emigration Agents.

4. With the exception of Mauritius and Guadeloupe, all Colonies received nearly the whole number of emigrants which they required. The numbers asked for and despatched in the year under review and the previous year respectively are compared in the following table:—

COLONIES.	1879-80.			1880-81.		
	Number of statute adults required by the Colonies.	Number despatched represented as—		Number of statute adults required by the Colonies.	Number despatched represented as—	
		Statute adults	Souls.		Statute adults.	Souls.
Demerara	4,000	4,161	4,496	5,500	4,168	4,416
Trinidad	2,912	2,889	3,161	3,130	3,100	3,342
Jamaica	689	689	756	350	480	513
St. Lucia	60	60	66	320	300	321
St. Vincent	200	196	213	None	None	None
Mauritius	Males 225	479*	539	Males 125	208*	235
Natal	None	None	None	" 1,100	918	980
Surinam	300	297	320	1,000	893	965
Guadeloupe	1,450	1,522	1,685	1,300	1,325	1,413
Total ...	9,836	10,293	11,236	13,025	11,292	12,185†

The terms offered for immigrants remained unchanged in all Colonies except Natal, where higher wages are given for railway work and skilled labour than for field work.

---

* These numbers include the females also. Requisitions from Mauritius specify the number of men only, and leave the number of women to be adjusted by the rule regulating their proportion.

† This number includes 30 passengers related to the emigrants.

5. The difficulty experienced in providing the number of labourers required by the colonies has led to an extension of operations in the North-Western Provinces and the Punjab, and the number of recruiters licensed has in consequence risen from 443 in 1879-80 to 559 in 1880-81. It is gratifying to observe that the number of licenses cancelled for misconduct was only 4, or under two per cent. of the whole—a result which speaks well for the care shewn by the Agents in the selection of their subordinates.

6. The following table given by the Protector shows the local extension of recruiting operations which has taken place within the past five years. Bengal has almost ceased to be a field for the supply of Colonial Emigrants, while the North-Western Provinces and the Punjab are contributing in increasing proportions.

YEARS.	North-Western Provinces.	Oudh.	Behar.	BENGAL.				Central India.	Punjab.	Orissa.	Nepal.	Mixed, Madras and Bombay, &c.	Total.
				Western.	Central.	Eastern.	Total.						
1876-77	38·46	16·86	31·62	3·20	2·49	0·37	6·07	1·39	0·65	0·25	1·21	3·43	7,734
1877-78	49 21	22·52	16·43	0·70	0·60	0·14	1·44	1·06	0·37	0 09	0·22	8·62	18,488
1878-79	54·22	26·88	15·90	0·60	0·49	0·09	1·21	0·75	0·25	0·08	0·23	0·36	15,865
1879-80	55·48	15·48	20·55	1·53	0·80	0·35	2·69	3·01	1·25	0·17	0·25	1·08	11,236
1880-81	58·76	15·69	14·42	0·93	0·85	0·14	1·93	1·73	6·25	0·15	0·35	0·68	12,185
Total average ...	52·00	20·43	18·43	1·18	0·88	0·19	2·25	1·48	1·61	0·13	0·37	3·22	65,508

The apparently remarkable coincidence between the numbers of emigrants recruited for the Colonies in the North-Western Provinces, Oudh and Behar, and those for the tea districts in Chota Nagpore, Bengal, and Behar has, together with the reasons which render the comparison deceptive, already been noticed the Lieutenant-Governor's Resolution on the Inland Emigration Report.

7. The information placed at his disposal by the Emigration Agents has again enabled the Protector to show the ultimate disposal of all emigrants recruited during the year, the results of which are now susceptible of comparison with those of the preceding year—

1879-80.

COLONIES.	Total number undisposed of last year.	Number shown to have been registered during the year by the returns received from Registering Officers.	Deserted.	Discharged as unwilling.	Rejected.	Died.	Claimed by relatives.	Total.	Detained.	Total.	Number shown by the Emigration Agents' returns to have been admitted into depôt.	Number born in depôt.	Total number of souls accommodated in depôt, including the 8 births in depôts.	REMARKS.
Demerara	...	5,107	40	4	20	4	3	71	188	259	4,848	3	4,851	
Trinidad	...	3,795	56	10	64	1	15	146	47	193	3,602	...	3,602	
Jamaica	...	1,168	10	2	40	2	2	56	28	84	1,024	...	1,024	
St. Lucia	...	72	...	...	...	...	...	...	3	3	69	...	69	
St. Vincent	...	317	1	...	3	...	...	4	25	29	288	...	288	
Mauritius	134	523	1	...	2	...	...	3	...	3	520	...	654	This number includes 134, balance of last year.
Surinam	...	345	...	...	...	...	...	...	...	...	345	1	346	
Guadeloupe	...	1,956	31	6	20	...	...	57	...	57	1,899	4	1,903	
Total ...	134	13,223	139	22	140	7	20	337	291	628	12,595	8	12,737	

1880-81.

COLONIES.	Number shown to have been registered during the year by the returns received from Registering Officer.	PARTICULARS OF CASUALTIES AFTER REGISTRATION.								Number shown by the Emigration Agents' returns to have been admitted into depôt.	Total number undisposed of last year.	Number born in depôt.	Total number of souls accommodated in depôt, including the 17 births in depôt.
		Deserted.	Discharged as unwilling.	Rejected.	Died.	Claimed by relatives.	Total.	Detained.	Total.				
Demerara	5,168	44	2	12	2	3	63	30	93	5,075	3	7	5,085
Trinidad	4,281	107	19	52	3	23	204	97	301	3,980	...	2	3,982
Jamaica	760	8	2	16	...	...	26	22	48	712	...	1	713
St. Lucia	515	1	...	3	...	1	5	23	28	487	...	1	488
Mauritius	259	3	...	...	...	...	3	...	3	256	46	...	302
Natal	1,593	22	...	...	1	...	23	...	23	1,570	...	...	1,570
Surinam	1,166	13	...	...	1	4	18	8	26	1,140	...	3	1,143
Guadeloupe	1,688	42	4	12	1	3	62	27	89	1,599	...	3	1,602
Total ...	15,430	240	27	95	8	34	404	207	611	14,819	49	17	14,885

As noticed by Dr. Grant, both Demerara and Jamaica show more satisfactory results in respect of casualties than last year, the respective percentages being 1·79 and 6·31, against 5·07 and 7·58. In the latter Agency, however, the proportion of rejections (one-third of the total number of casualties) is still larger than it should be, and the Lieutenant-Governor is glad to learn that the attention of the Agents for this colony as well as for Trinidad (where the number of desertions was also large) has been called to the necessity for removing those defects in the system of recruitment and medical examination which these figures seem to indicate. There is no doubt that it is best, in the interests alike of agents and emigrants, that medical examination, should, where practicable, precede registration. Complaints are said to have been made regarding the laxity with which medical examinations are conducted in the recruiting depôts, and it is possible that these are in some instances well founded. As the Protector, however, observes, where laxity exists it is probably due, in part at all events, to the anxiety on the recruiters' part that their emigrants should if possible be passed; many doubtful cases thus escape notice until examined by the Medical Inspector, and the object of holding the examinations is to some extent defeated.

8. The total number of emigrants accommodated in Calcutta depôts was 14,885, against 12,737 in the previous year. Of these, 12,155 or 81·65 per cent. were embarked, and 340 were in depôt at the close of the year. Of the remainder, 1,034 were rejected, 717 deserted, 344 were released on transfer to other agencies, or remained in depôt at their own request under engagement for Natal; 87 died and 22 deserted from the Natal Agency during its transfer. The percentages of rejections, desertions, and deaths were 5·91, 4·81, and 0·58 respectively, as against 4·56, 2·59 and 0·29 in the previous year. The increase in rejections has been noticed above. Desertions were, Dr. Grant considers, abnormally high, and are ascribed by him mainly to the influence of mischievously disposed returned labourers, who, to serve their own ends, endeavour to induce emigrants to desert from the depôts. It is, however, difficult to see what object these men can have had in view, and the explanation on the subject given by the Protector does not seem satisfactory. It seems probable that the absence of those causes—such as dearness of food, scantiness of harvest, and the like—which impel labourers to emigrate, and the high wages to be obtained near Calcutta, are the main causes which induce them to change their minds while in depôt. The absence of cholera from the depôts is gratifying, but in other respects the year was not very favourable, the mortality from bowel-complaints and chest affections being high. The Protector has not explained why those diseases should be so prevalent in depôts for colonial emigrants, while the depôts for inland emigrants were almost free from them. This is a matter which calls for further enquiry and report.

9. The prescribed proportion of female to male emigrants was satisfied, taking the average shipments of the season, in the case of all Colonies except Natal and Surinam. The deficiency in regard to the former colony was made up during the season, though not till after the close of the official year. In the case of Surinam there still remained a small deficit of 48 to be covered by the first shipment of the present season.

10. Twenty-five sailing vessels left Calcutta for the Colonies, conveying an average number of 487 emigrants as against 23 vessels with 449 emigrants in the previous year. In regard to the 19 vessels for which reports have been received the bills of mortality are satisfactory, with three exceptions, in which the death-rate reached 4·58, 5·42 and 6·32 per cent. Last year the highest percentage of mortality was 2·61. The general results, however, were the best for the last 5 years, the total mortality being only 2·2 per cent. The lowest figure previously reached was 3·9 per cent. in 1876.

11. The total number of emigrants who returned from the Colonies during the year (4,137) was less by 261 than in 1879-80. Their average savings were Rs. 180-10-5, and amounted in the aggregate to nearly 7½ lakhs of rupees. Three hundred and twenty coolies, with an average amount of Rs. 56-4-2 as savings, returned from Réunion in French steamers.

12. The thanks of Government are due to Dr. Grant for his efficient management of the department during the year.

By order of the Lieutenant-Governor of Bengal,

A. P. MacDONNELL,

Offg. Secretary to the Govt. of Bengal.

APPOINTMENT OF A COMMISSION TO ENQUIRE INTO THE CAUSES OF THE EPIDEMIC FEVER IN NUDDEA AND BEERBHOOM.

MEDICAL AND MUNICIPAL DEPARTMENTS—SANITATION.

Calcutta, the 10*th November* 1881.

RESOLUTION.

READ—

Circular No. 28, dated 7th August 1877, to all Commissioners, regarding the removal of obstructions to drainage.

A letter dated 9th April 1878 from Rajah Digumber Mitter, C.S.I., regarding the cause of epidemic fever in Bengal.

Resolution dated 29th April 1878, regarding the improvement of drainage and water-supply.

Circular No. 15, to all Commissioners except of Presidency Division, and letter No. 1585 to Commissioner of Presidency Division, dated 29th April 1878, calling for reports on the steps taken to carry out the instructions contained in the circular of 7th August 1877.

Letter No. 7268, dated 23rd September 1879, from Sanitary Commissioner, letter dated 11th October 1879 from the Secretary to the British Indian Association, and reports from Commissioners with reference to the Resolution of 29th April 1878.

Resolution dated 12th June 1880, reviewing these letters and reports.

Letter No. 5—7, dated 18th January 1881, to Commissioners of Burdwan, Presidency, Rajshahye and Cooch Behar, enquiring what special measures had been taken in those Divisions upon the orders contained in paragraph 4 of that Resolution.

Resolution dated 17th May, reviewing their replies.

Papers regarding the outbreak of malarious fever in the Nuddea district, beginning with Government letter No. 1198, dated 17th November 1880, and ending with Sanitary Commissioner's endorsement No. 1782F, dated 3rd instant.

The Lieutenant-Governor has watched the progress of the outbreak of malarious fever in the Nuddea district with grave anxiety and regret. Medical aid has been freely supplied, and a large staff of Hospital Assistants and Assistant Surgeons, under the special direction of the Deputy Sanitary Commissioner, have been for some months engaged in moving about among the most unhealthy villages and treating the sick. There are at present 30 medical subordinates thus employed under Dr. Gupta. Nevertheless the reports which have been submitted, and the enquiries which the Lieutenant-Governor has personally made in the district, leave no doubt that the suffering and mortality are still very great; while there is reason to fear that, as the cold season advances, the number of victims among those already debilitated by disease will still further increase.

2. The recurrence of this fever in a severe epidemic form two seasons in succession seems to point to some local cause distinct from climatic influence. The Lieutenant-Governor finds that there is a very general impression that the unhealthiness of the district is due to obstructions to its natural drainage. That this cause is operating generally to produce fever throughout the country the Lieutenant-Governor has no doubt whatever, and he has never lost an opportunity of impressing upon District Officers and Municipal and Road Committees the great importance of doing or causing to be done whatever may be possible to remove this fruitful source of disease. He has promised that such assistance as Government can afford shall always readily be given to supplement local efforts; and several special grants have been made. He has recently made a special grant of Rs. 50,000 in aid of the Nuddea District Road Fund, on the understanding that a substantial proportion is to be spent on supplying bridges and culverts where the drainage is now obstructed by embanked roads. An Engineer has already been deputed to survey and take levels for a scheme to improve the Unjonah river, and thus provide for the efficient draining of the town of Kishnaghur; and the Lieutenant-Governor has promised, if efforts are made to raise local subscriptions, to make a grant for the completion of such project as may be adopted.

Meanwhile, however, he is satisfied that the question of the cause of this virulent outbreak should be thoroughly examined by a Commission armed with power to apply such remedy as they may consider urgently called for. The Commission will consist of—

Dr. R. G. Lidderdale, Sanitary Commissioner ... *President.*
Mr. A. W. Paul, Joint-Magistrate ... } *Members.*
Mr. T. Haines Wickes, C.E., Superintending Engineer ... }

They will spend the cold season in visiting the worst villages, and examining carefully their sanitary condition and the cause of their unhealthiness. They should, as far as possible, inspect all the roads constructed during the past 15 years, and ascertain whether there is any truth in the statement so often made of the inadequacy of the waterway provided in such roads. They should carefully enquire into obstruction of drainage by the silting up of old channels and creeks; they should give special attention to the supply of drinking water, and should endeavour to induce the people, where the water-supply is now deficient, to clean old tanks and re-excavate new tanks, and place them under the charge of the village punchayat, in order that they may be kept clear for water-supply. They should impress upon the more intelligent villagers the necessity of purifying water, and show how simply and cheaply an efficient filter can be constructed. The zemindars should be called upon to assist in opening and draining channels and excavating tanks. The precaution of sleeping on raised platforms or *machans* should be impressed upon the people. The Magistrate and Collector will give to the Commission every assistance in his power, and he or one of his subordinates, and if possible the Road Cess Engineer, should accompany the Commission, where this can be done without detriment to other more important work. If the Commission can finish the work in Nuddea before the end of the cold season, they should visit Beerbhoom and endeavour in the same way to trace the cause of the fever outbreak in that district. They will be at liberty to make any improvements that they may consider urgently necessary up to a present limit of Rs. 50,000. A report of the result of their enquiries should be submitted after the close of the camping season.

By order of the Lieutenant-Governor of Bengal,

COLMAN MACAULAY,

Offg. Secretary to the Government of Bengal.

Circular No. 28, dated Calcutta, the 7th August 1877.

From—A. Mackenzie, Esq., Offg. Secy. to the Govt. of Bengal, Financial Dept.,
To—All Commissioners.

I am directed to request that you will call the special attention of the District Officers and Municipal Commissioners of your Division to the provisions of Act VI (B.C.) of 1873, so far as these furnish a means of improving the drainage of town and village sites.

2. It is a recognized fact that much unhealthiness is caused by obstructed drainage and consequent dampness of the subsoil; and although the Lieutenant-Governor is not prepared to undertake the impossible task of draining at the expense of the State all the unhealthy districts of Bengal, he believes that very much may be done in the way of improvement by well-directed local effort, and without any very great expense.

3. Within the limits of regularly constituted municipalities, it is in the power of the Commissioners to effect improvements and remove obstructions, so far as their funds will allow and the provisions of the Municipal Act permit, and they have also very extensive power of coercing private owners. They should be stirred up wherever necessary, and called upon to devote special attention to this branch of their town conservancy.

4. But there may be cases even in towns to which the Municipal Act will not apply, and in which it is not proper that the cost of improvements should fall upon the rate-payers. There are also numerous villages outside municipal limits possibly suffering from the effects of obstructed drainage, and the health of a municipality may be affected by evils lying beyond its own jurisdiction. In such cases the provisions of the Embankment Act furnish a ready remedy.

5. By that Act a water-course is defined to include a line of drainage, weir, culvert, pipe, or other channel for the passage of water, whether natural or artificial. Under section 4 the Collector has power to cause to be removed or altered "any obstruction of any kind which interferes with the general drainage of any tract of land." He may construct any water-course, or effect any alteration in any public water-course, when this is required for the improvement of the health of any village. He may call upon the person in charge of any

road which interferes with the drainage of any tract of land to alter such road, or to construct any water-course under or through such road; and if the person so called upon fails to obey the order, the Collector may carry out the work at his expense, so far at least as it was necessitated on account of insufficient provision having been made at the time of constructing the road for the natural drainage then existing.

6. The Act gives the Collector ample powers for carrying out any works of the above description, and for assessing the cost, where individuals are not liable, upon the estates and tenures benefitted thereby.

7. There is nothing to prevent a municipality, or any other public body or individual, from moving the Collector to take action under the Act; and the Collector has always at his disposal the professional services and advice of the officers of the Public Works Department.

8. The Lieutenant-Governor, as he has already said, believes that it is by judicious, local action that the evils referred to in paragraph 2 of this letter will most effectually be met; and he desires to call the special attention of all Commissioners, District Officers, and Municipalities to the remedies that already lie open to their hand.

9. At the same time, it must always be remembered that much harm may be done to individual interests, and much waste of public money may be caused, by hasty and ill-considered action. In every case there must be careful and intelligent enquiry as a preliminary to remedial measures, and there should be a reasonable certainty of positive good as their result. The provisions of the Board's circular order No. 3 of May 1875 will also have to be borne in mind by Collectors.

Dated Calcutta, the 9th April 1878.

From—Rajah Digumber Mitter,

To—His Honor the Lieutenant-Governor of Bengal.

As I feel convinced, after careful inquiry and observation extending over the last fourteen years, that the cause of the disease, commonly called the epidemic fever, which rages endemically every year in this country after the close of the rains, and which has reduced some of the fairest portions of Bengal into a chronic state of unhealthiness, and rendered them unfit for human habitation, is an easily preventible one, I venture to approach Your Honor with the following remarks and suggestions on the subject.

The sole cause to which I attribute the outbreak of the fever, which, as I have observed above, rages endemically every year in this country after the close of the rains with epidemic intensity, was thus described by me in a pamphlet on the subject (page 16) which I issued some time ago:—"The type of fever met with in the epidemic districts is solely due to *something* in the soil, and the condition most favourable to the development of *that something* is excessive or abnormal humidity of the subsoil; secondly, that when such a state of the subsoil is not the normal condition (in some places excessive humidity is natural, owing to the extreme porousness or some other peculiarity of the soil, as in the case of almost the whole district of Rungpore, where consequently this type of fever rages endemically), the cause which operates most powerfully to produce that condition is impeded drainage; and thirdly, that it is the inordinate humidity of the subsoil of towns and villages, and not of the paddy-fields and jullas, which contributes to the outbreak of the fever with epidemic intensity. Strange as it may appear, it is none the less true that the fact that the natural drainage of a Bengal town cannot with impunity be interfered with, which of all others should have forced itself generally into notice, is yet just the one least generally known or recognized; and it is to this ignorance or indifference that is to be attributed the ruin of many flourishing cities and towns, both in earlier and later times."

As a most significant fact, expressive of the normal sanitary condition of the country, consequent upon the periodical rains, and one calculated to throw considerable light on the subject-matters of enquiry, I quote the following from page 37 of the same pamphlet:—"It should not be forgotten also that every village in Lower Bengal is more or less humid after the cessation of the rains—from the beginning of October to the middle of December—more so than during the continuance of the rains, and fever, precisely of the epidemic type, though not in an aggravated form, is more or less rife throughout Bengal during those months than at any other time of the year. Hence the period is characteristically described in our country by the term of Jamastaka, meaning that during that period all the eight portals of the mansion of Pluto are open to receive the dead. The same cause, therefore, viz. the humidity of the subsoil and evolvement of that *something* in consequence thereof which under its normal condition favours the advent of the intermittent type of every year in a mitigated form when intensified, as would necessarily be the case when the humidity of the soil is aggravated by obstructions offered to the surface drainage of a village during the rains, and thereby allowing it to be wholly absorbed in the subsoil, would usher in the fever in an epidemic form. We would entreat those who are engaged in enquiry into the cause of this epidemic to bear this significant fact in mind, inasmuch as all their investigations are sure to prove disappointing, if they start with an idea that the fever met with in the epidemic villages is a stranger to the land."

I would draw Your Honor's particular attention to the fact I have specially noticed in stating my opinion as to the causation of the epidemic fever of the malarious type, as shown in the first quotation, viz. "that it is the inordinate humidity of the subsoil of *towns* and *villages*, and not of the *paddy-fields* and *jullas*, which contributes to the outbreak of the fever with epidemic intensity." If it were otherwise, the task of removing the cause of the fever would be quite a hopeless one, nor would I have ventured to address Your Honor on the subject. The following is what I have said on this point on page 42 of the pamphlet in reply to those who hold that subsoil drainage and the drainage of bheels and paddy-fields are the only means by which the outbreak of the epidemic fever in this country can be prevented:—"To account for the epidemic you are not therefore to look to the soil of the rice-fields or of the bheels, but to that of the villages themselves; and if it is water-logged, the true remedy, as in the other case, is to be found in the removal of the obstructions which have been offered to the drainage course of a village, and not in subsoil drainage. For, however humid or water-logged the soil of a village may be, it will, under the scorching sun, but without the aid of any subsoil drainage, be perfectly dry by April, when also the epidemic fever, however virulently it may have been raging, will of itself begin to abate. To prevent a recurrence, we have only to restore the natural drainage of the villages, and they will without any other treatment return to their normal condition. In fact, the application of subsoil drainage to Bengal with its periodical rainfall of 80 inches, the rivers full to overflowing during the monsoon, and three-fourths of its arable lands under water at least during four months of the year, and relying upon it as a sovereign remedy for the eradication of the disease, appears to us as reasonable as the conduct of the man who waited in expectation of fording the river when it would become dry during ebb-tide. The undertaking recalls to our mind the feat of our ancient sage Agastya, who is said to have brought the sea into the hollow of his palm and then drunk it off."

The above is subscribed to by no less an authority than Dr. M. Von Pettenkoffer of Munich, as the following extract from his letter to Dr. L. Salzar, of this city, and published as Appendix No. 3 to the pamphlet, will show:—"To me, as to the author (meaning myself) it always appeared that the dwelling-ground of the people has much more to do with the origin of the disease than has the surrounding districts or land, as rice-field, marshes, &c." Sir George Campbell, during the latter part of his administration, was, upon close enquiry instituted upon this subject through Colonel Haig and others, so strongly impressed with this fact that he went even to the length of asserting that "in these reeking swamps (meaning the bheels, jullas, and paddy-fields) the human race seems to have multiplied to a greater extent than anywhere in India, perhaps in the world."

Dr. French thus remarks in his pamphlet on the "Burdwan Fever" (page 55):—"I generally remarked that the villages in the vicinity of a large jheel (small lake) suffered very little, if at all, from the fever. This is owing to the fact that from the jheel the level of the land rises to the village site, and in consequence there is free drainage from the village into the jheel and thence into the khal and river." Thus Your Honor will observe that the opinions at one time entertained both by medical men and engineers as to the bheels, jullas, and paddy-fields of the country, being the generating cause of the fever in its epidemic form, has been proved to be totally unfounded.

I beg to be permitted to state here the process of enquiry which led me to the conclusion "that it was the abnormal humidity of the subsoil of villages and not of paddy-fields, consequent upon obstruction offered to the drainage which they normally enjoyed, which caused the endemic fever of the country to break out in those villages with epidemic intensity."

In the year 1864 a Commission was appointed to enquire and report upon the causes of the fever, which since some years was raging epidemically in some of the villages in the districts of Hooghly and 24-Pergunnahs. As a member of that Commission, I visited a large number of the fever-stricken villages with a view to elicit such information from the villagers as might throw light on the subject-matter of our enquiry. Amongst other questions, I asked the villagers whether they observed anything unusual in the physical peculiarities of their respective villages, and the answer I invariably received was that their houses had become unusually damp since the outbreak of the fever in an epidemic form, and related many significant facts corroborative of the same. This peculiar feature of the fever-stricken villages corresponded exactly with what I observed in Cossimbazar, which was almost depopulated (*vide* appendix of the pamphlet) by the outbreak of this type of fever in an epidemic form some 90 years ago, and which was still in a chronic state of unhealthiness. The exact similitude of this feature of the fever-stricken villages with that of Cossimbazar struck me at once, and led me to conclude that this unusual dampness must be intimately connected with the cause of the fever.

My next inquiry was devoted towards the drainage condition of the fever-stricken villages, as this abnormal dampness must, I concluded, be owing to excessive or unusual absorption of the periodical rainfall in the subsoil of those villages. As nature has blessed or cursed this land with a periodical rainfall of 60 to 70 inches within three or four months, she has also provided it with a beautiful and simple drainage system whereby to get rid of this large quantity of water from the village site. The natural drainage system of the country, as I have stated on page 5 of the pamphlet, is as follows:—

"The drainage of all the villages in the epidemic districts, as elsewhere in Lower Bengal, is effected by the water first running into the nearest paddy-fields lying in the direction of their slope; thence it collects in the *bheels*, from which it rushes through *khals* into larger streams, which again communicate with navigable rivers. An obstruction occurring in any one of these conduits must interfere with the drainage, and its effects are felt more or less according to the proximity or remoteness of the obstruction from the scene of its influence. Accordingly, it has been found, as will be noticed more particularly hereafter, that the stoppage of the mouths of the different streams has not been productive of such serious consequences to the villages lying within their influence as when the same occurred more in the vicinity of those villages."

There is scarcely a single village in Lower Bengal which has not a paddy-field or bheel adjoining, or in close proximity to it, indicating at once which way the slope of the village runs. We also know as an undeniable physical fact that the river-bank being high, the slope of the villages lying on it is necessarily inland. Bearing these physical peculiarities of the country in mind, one can easily trace, without taken levels or calling in the aid of a professional engineer, whether any obstruction has been offered to the drainage of a particular village in its flow to its natural outfall.

In prosecuting my inquiry into the drainage condition of some of the fever-stricken villages according to the laws stated above, I found in every instance, not only that obstruction had been offered to the flow of the monsoon water from the village to its natural outlet, but that the virulence, of the fever, and the interval which preceded its outbreak were regulated according to the proximity or remoteness of the obstruction from the scene of its influence.

That the conclusions I have been led to from close observation and analysis of facts are quite in accordance with scientific opinion on the subject, will appear from the following extract from the "Retrospect of Medicine," edited by Dr. W. Braithwaite:—"It is an established fact that the presence of vegetable matter is by no means necessary for the production of malarious disease. Ample proof of this is cited by Dr. Watson in his "Lectures" and by Mr. Martine in his work on "Tropical Climates." The former adopts the plain conclusion that "for producing malaria it appears to be requisite that there should be a surface capable of absorbing moisture, and that this surface should be flooded and soaked with water and then dried; and the higher the temperature and the quicker the drying process, the more plentiful and the more virulent (more virulent flooding because more plentiful) is the poison that is evolved." Again, "there is reason to believe that the flooding of a porous earthy surface with water, and the subsequent drying of that surface under a certain degree of heat, constitute the sole or main conditions of the generation of the poison." I need not say that the conditions requisite, according to the above opinion, for the production of malaria are to be met with in this country in a superabundant degree. We have the periodical rains flooding the surface of the country with water, the soil porous enough to absorb that moisture and a powerful sun to dry the surface. Such being the scientific opinion as to the generating cause of malaria, and its correctness being so conclusively testified to by the prevalence, as observed elsewhere, of that type of fever every year in this country after the close of the rains (Jamastaka), it cannot be unreasonable to suppose, aye the inference is irresistible, that the same cause which contributes to the propagation of the fever in this country in an endemic form must, when intensified, cause it to break out with epidemic virulence. What, it may be well asked, can more contribute to the aggravation of the humidity of the subsoil, the generating cause of the fever, than obstructions offered to the drainage of a village? If with all the facilities offered by the natural drainage system of this country, supplemented by artificial improvements, every town and village more or less suffer from fever of the malarious type every year after the rains, because with a rainfall of 60 or 70 inches within three or four months, a portion of it cannot but be absorbed in the subsoil, will not the generating cause of the fever be considerably aggravated, if, by obstructions offered to drainage, almost the whole, at least the bulk, of the rainfall, not finding its way into its natural outfall, is necessarily absorbed in the subsoil of a village? And this has precisely been the case, as shown by many striking instances I have mentioned in my pamphlet, wherever the fever has broken out in this country with epidemic virulence. So far as Lower Bengal is concerned, I would supplement the above theory as to the generating cause of malaria by adding that as malaria is produced by the drying up of the earth saturated with water, so it is almost entirely eliminated by the complete drying of the subsoil, which is effected by the middle of April, when even the paddy-fields begin to crack and when patients heretofore suffering from fever begin to recover without the help of medicine, except in cases complicated with the enlargement of the spleen and liver.

I would not trespass on Your Honor's valuable time by reproducing any of the many striking instances I have mentioned in the pamphlet showing how obstructions offered in various ways to the drainage of particular villages had been invariably followed by the outbreak therein of fever of the malarious type with epidemic virulence. I should only mention that notwithstanding inquiries of the most scrutinizing character from time to time instituted by the local authorities, evidently under the instructions of the Bengal Government, to test the correctness of the facts mentioned by me, as would appear from a report of such inquiries published in the *Calcutta Gazette* of 16th February 1873, not a single fact has yet been successfully controverted.

The only instance in which attempt was made to test the correctness of my theory by actual experiment was in the case of Dwarbashini, stated at length on pages 24 and 25 of the pamphlet. The obstruction offered to the drainage of that very large and important village, in the manner mentioned by me, and which, as an inevitable consequence, was followed by the outbreak of the fever with epidemic virulence, was removed under the orders of Mr. Montressor, the then Commissioner of the Burdwan Division, at an expense of only Rs. 300, and it resulted in complete success (*vide Calcutta Gazette* of the 20th December 1865), proving at the same time with what comparatively small expenditure the cause of the epidemic fever could be removed and the fever-stricken villages restored to their pristine healthiness.

Although, as observed above, it was only in the case of Dwarbashini that my theory was practically tested, still ample testimony to its soundness is borne in other ways by medical men and others who have devoted attention to the subject. I beg, with Your Honor's permission, to mention two instances. In tracing the cause which, according to the laws enunciated by me, must, I thought, have contributed to the depopulation and ruin of many cities and towns, Gour for instance in olden times, by the outbreak therein of this type of fever in a virulent form, I stated as follows in pages 19, 20, and 21 of the pamphlet to account for the cause which had reduced the once healthy town of Berhampore, &c. (Berhampore would not have been selected for a military cantonment unless it was healthy), to a chronic state of unhealthiness ever since some 60 years. "As regards the Dutch and the French settlements of Kalkapore and Furrasdanga, those places are also situated on the same side of the river with Cossimbazar and in a continuous line with it. The presence of a bheel, called Bistopore or Kalkapore bheel, to their south-east plainly attests that the drainage of those places must at one time have passed into it, while that of a pucca road between the bheel and the towns, and of another between the bheel and its natural outfall, the Gobra Nullah, likewise attest how completely the drainage of those places had been, and still is, intercepted by those roads. All these places are still in existence, with the same type of fever prevailing in them, though the disease is not so fatal to the residents as to new-comers. Adjoining Furrasdanga, to the south, are situated, in a continous line, the famous town of Syedabad, the old settlement of the Armenians, Khagra, the native town of Berhampore, famous for its brass cups and plates, and the cantonment of Berhampore itself. All these places drained themselves into the abovenamed bheel Bistopore; the last through a series of tanks. In all these places fevers of the malarious and intermittent type have prevailed endemically since the last 50 or 60 years, though never in that virulent form which caused the utter depopulation of Cossimbazar, Kalkapore, Furrasdanga, Choonakhally, and Bhatpara. The cause of this chronic unhealthiness is not far to seek. Bheel Bistopore, which is the drainage receptacle of all these places, like bheels Chaltia, Chandor, and Bhoula, lying to the south and south-east of it, emptied itself through Gobra Nulla into the Jellinghee, until an embanked pucca road from the city of Moorshedabad to the cantonment of Berhampore, constructed some 50 or 60 years ago, completely cut off its communication with this nullah or channel, and converted it into a lake without communication with any outfall. As is naturally to be expected from such a state of things, the bheel becomes quite full after a few heavy showers of rain at the commencement of the monsoons, when, having no outlet for its overflow, it refuses to receive the surface drainage from the abovenamed places, and the monsoon water consequently is absorbed in their subsoil. Hence it is that the unhealthiness of those places every year, after the close of the rains, bears a direct ratio to the rainfall for the year. It is true enough that there are two sluices constructed in the embankment which protect Berhampore from the inundations of the Bhagiruthee, and are evidently designed to carry off the overflow of the bheel into that river, but it so happens that during the monsoons the water-level of the Bhagiruthee is higher than that of the bheel, consequently the sluices do not answer the object for which they were designed. It is to us unaccountable that these simple facts have never been noticed, and the drainage of the places have not been restored. This restoration can be accomplished easily and at no great expense, simply by restoring communication of the bheel with the Gobra Nullah by means of a sufficiently wide and deep drain. Though belonging neither to the profession of medicine nor of engineering, yet we can safely guarantee the recovery, by the places named, of their original healthiness if our simple suggestion be adopted. The improvement, we warrant, will follow within two years of the completion of the proposed drain." It so happens that a drain similar to the one recommended by me in the above extract has been cut, and with what success will appear from the following quotation from page 103 of the report of the Sanitary Commissioner for Bengal for 1872, published at the latter end of 1874:—

"In Berhampore, a notoriously moist and unhealthy station, situated four feet below the high flood-level of the Bhagiruthee, and protected from inundation by a bund, a drainage scheme, devised by Mr. Wicke, the Executive Engineer, and involving no great amount of outlay, received the sanction of Government in August, and has since been partially completed.

"The plan, which will easily be understood from the accompanying map, consists in cutting a drain of adequate depth from the barrack square, one of the lowest levels in the station, to the river Gobra, about six miles distant to the eastward. In its course, which is that of the natural dip of the land, this drain taps and carries off the surplus water from two enormous bheels—the Chandor and Bhoula Bheels—east of, and contiguous to, the sepoy lines.

"The original scheme contemplated the construction of a branch channel to drain the jail site, but the jail having been removed, this was no longer so necessary, and has been given up.

"The result of the work appears to have been most satisfactory, and not only has the station been rapidly and effectually drained, but the water has been made use of during the the past year of scanty rainfall to irrigate 1,700 beeghas of land which would otherwise have been comparatively unproductive.

"In 1871, for want of such a drain as this, the whole of the sepoy lines, the race-course, and parade ground, were under water for a month or six weeks, and a great deal of malarious fever prevailed in and around the station.

"There was a similar, but less extensive, inundation in 1856.

"It is believed that this work, which cost only Rs. 15,000, will have the effect of entirely preventing such collections of surface water in the station and its vicinity in future.

"It is very desirable that the unhealthy condition of Cossimbazar, a perfectly pestilential locality, about three miles north-east of Berhampore, should be remedied: it is purely a question of drainage and conservancy. If the proprietors will do nothing, it would be well to include the place within the municipality and tax them sufficiently to enable the observance of conservancy rules to be enforced. The people live in a state of chronic fever; all the children have spleen, and though one at least of the landed proprietors (the Ranee Shurnomoyi) is very charitable, and gives freely both medicine and food, this can only be considered as palliatives. The place should be drained, the tanks cleansed, and the excessive filthy habits of the people put an end to."

It does not appear from the quotation whether the drain in question is connected with bheel Kalkapore. For reasons stated by me, the success of the experiment, although, so far as it goes, flattering to me, will not be complete unless the connection is made, and the bheel Kalkapore thereby relieved of its surplus water by its flow into the Gobra Nullah, and the bheel in question thus enabled to receive the drainage of Berhampore, Khagra, and Syedabad, of which it is the natural drainage channel, in years of heavy rainfall. The following was written by me in regard to the outbreak of the epidemic fever in Jessore:—

"We will conclude these remarks for the present by giving an instance of how an important town has partially recovered its healthiness by the partial restoration of its natural drainage. On the south and west of the river Bhoirub is situated the town of Jessore with its drainage receptacle, the bheel Harina, lying to the south-west of it. A road, called the Dacca road, constructed, it is said, about 60 years ago, runs along its south and western boundaries, intercepting the drainage of the town in its way to the bheel. How unhealthy Jessore has been for a long course of years is well known. Although we cannot ascertain the exact year in which the above road was constructed, yet we make ourselves bold enough to say that the unhealthiness in question dates within a year or two of the construction of the road. The correct information on the subject cannot, however, be unavailable to the Public Works Department, and we shall be glad to stand corrected in the matter. Cholera is said to have been first introduced into this country from Jessore, and its handmaid, the malarious epidemic fever, after committing a frightful havoc about fifty years ago, settled down in Jessore endemically, as in Cossimbazar and its neighbourhood. Not a soul could be met with there who had not a sickly tumid belly and lanky extremities to present. All the laws of sanitation known to the authorities, from the filling up of holes and dirty tanks to the cutting up of jungle, had been experimented upon and exhausted. So much so, that with the exception of a few cocoanut trees not a single old tree of any kind could be met with in the place within a few years of the breaking out of the disease. The natural drainage course of the place when intercepted by the intervention of the road in question, had been attempted to be diverted towards the river on which the town is situated, but ineffectually, as the river was not tidal there, and was so constantly full to overflowing during the rains that, instead of receiving the drainage, it would very often inundate a portion of the town itself. Thus a new evil was brought on, and the authorities, leaving aside the question of sanitation, had to direct their attention as to how to protect the town from inundation. Towards the latter end two drains were caused to be excavated, running parallel to and at some distance from each other, and connecting the river Bhoirub with bheel Harina, thereby affording a vent to the overflow of the river into the bheel. But the drains, in their course to the bheel, passed through the town, and thus the natural drainage of the place, which had been obstructed by the Dacca road, was accidentally, though only partially, restored. The immediate consequence was a considerable improvement in the sanitary condition of the town, which has lasted ever since. No one that we are aware of has noticed this; and there may be persons disposed to attribute the improvement to tank-filling, jungle-cutting, and other forms of folly and extravagance which have acquired such unenviable notoriety of late. The improvement, however, will be only complete when the drainage channels of the place, which are yet directed towards the river, are diverted to the two drains."

The following quotation from Dr. Unnodapersad Kastogiri's prize essay on the "Epidemic Fever of Bengal" will show how thoroughly correct I was in my supposition that the construction of the Dacca road was the cause of the outbreak of the fever in Jessore, inasmuch as its presence, I found, intercepted the flow of the drainage of Jessore to its natural outfall, the bheel Harina.

"In 1834-35," says Dr. Kastogiri, "the Government commenced the construction of a road from Furreedpore to Jessore by convict labour. In 1836 the road progressed as far as Mahmoodpore, between it and its drainage outfall into the Keshwar Bheel, as far as Harekistopore, a mile to the south-east of Mahmoodpore. Fever of a virulent type broke out after the ensuing rains, both in Mahmoodpore and among the 700 convicts working on the road; of the latter, 200 are said to have died in a short time, on account of which the work was abandoned. Mahmoodpore was entirely deserted. It is now an insignificant village still containing many remnants of its old magnificent buildings.

"On the Nuddea side, the road mentioned before had progressed as far as the sudder station of Jessore, its south cutting off on its drainage outlet into the Harina Bheel, when fever of a destructive character broke out there. In short, the road, popularly called the *Dacca road*, brought disease and death along its progress into the villages, the drainage of which is obstructed—a positive fact in support of the obstruction of drainage and of outbreak of severe fever following each other as cause and effect."

It is evident from the above that it was not in Jessore alone that the fever broke out in a virulent form, but also in other places, the drainage channel of which had been likewise intercepted by the road in question. The following extract from Mr. Westland's report on Jessore, given in the report of the Sanitary Commissioner of Bengal for 1874, fully confirms the statement of Baboo Unnodapersad about the year the road was constructed. Mr. Westland says:—"Great sickness broke out here in the year 1836, when the Jessore and Furreedpore road was being constructed by means of convict labour. It was a fever begun with a headache, causing internal heat and carrying off the victims in about ten days. It continued here seven years and desolated the place" (Westland's Report, page 273). This concurrence of testimony is worthy of note.

In conclusion, I beg to quote the following from paragraph 6 of the pamphlet to show why is it that the endemic fever of the country has been raging with epidemic intensity much more extensively of late years, especially in the districts of Burdwan, Hooghly, and 24-Pergunnahs. "Have not a large number of roads, as railway feeders, or as ordinary highways, been constructed in both the affected districts during the last fifteen years,—not to mention the railway,—most of them crossing the drainage channels of villages? Further, have not many important khals, the drainage channels of villages, been closed by those roads, unprovided, as a rule, with culverts at the site of those khals; and have not many of them been likewise dammed up for the purpose of retaining water on their rice-fields by the zemindars, ignorant of the mischief they were thereby doing?" The above view is fully supported, as regards his own district, by the Civil Surgeon of Hooghly, as the following quotation from page 90 of the report of the Sanitary Commissioner for 1873 will show:—"The main cause to which attention has of late been mostly directed is the subsoil drainage, and there can be no doubt to any one who has studied the subject that the natural drainage of the country has been interfered with in many ways of late years; amongst those may be mentioned the many embanked roads that have been thrown up during the past 16 years. These roads must materially interfere with the drainage of a country whose inland communication was principally by water; these roads must also very materially influence the drainage of the villages near which they pass." To convey to Your Honor a proper idea of the present condition of most of the villages in the districts of Hooghly, Burdwan, and 24-Pergunnahs, I beg to quote the following from the letter of a correspondent of the *Indian Mirror* of 15th January last, under the signature of "A Homeless Man":—

"Within a few miles of the seat of Government, that is, on either side of the Hooghly, north of Calcutta, may be seen one continued scene of human suffering, caused by a fell epidemic, whose ravages every year during this time are most fearful. So great, indeed, is the calamity felt that those who have the means to remove have removed to Calcutta and elsewhere for the safety of their lives, while others have taken refuge under the roof of relatives and friends. Helpless men and women and children are left in the midst of the epidemic, and who can save them? Pale, emaciated, skeleton-like sufferers as they are, they one and all are under the baneful influence of spleen and fever, which at times attack them and contribute to the acceleration of their death. The houses are the habitation of owls and pigeons and wild beasts for want of human dwellers. I may, with propriety, call these "the deserted villages," concerning which a Goldsmith might find ample materials for thought and writing. What population there is, is made up of persons whose means do not allow of their removal from the place, and these form chiefly the rural population. Such is the state of things observable within a few miles of the metropolis of British India; and who really ought to enquire and try and remove, if possible, the sufferings indicated above? Most assuredly the paternal Government under which we have the good fortune to live. It may be that epidemics and such like calamities are providential visitations, still it is the duty and business, if human effort could do it, to try to relieve suffering humanity: and this relief is, as matters at present stand, loudly called for. Will the Government of the Hon'ble Sir Ashley Eden, than whom no Lieutenant-Governor ever was more conversant with the requirements of our province, give a cordial response to our appeal? I hope and trust it will." From my own personal knowledge of many of these fever-stricken villages, I fully subscribe to the above.

As already observed, the cause of this most deplorable state of things is, in my opinion, easily preventible. In 99 cases out of 100 the cause is traceable to obstructed drainage; and as the drainage of this country is not subsoil, but is effected by the monsoon water running over its surface, such obstructions as may have been offered in its flow to its natural outfall can be removed at a comparatively small cost, as has been already seen in the case of Dwarbashini. I would therefore, by way of experiment, humbly purpose that the line of villages from Bon-Hooghly to Barrackpore, situated between the river Hooghly and the Barrackpore road, should at once be taken in hand, and the cause of obstruction to their natural drainage be removed before the rains set in, so that the result of the experiment might be known after the close of the ensuing rains. All these villages, like Calcutta, are situated on the eastern bank of the river, consequently their drainage level must be towards the east, and this fact is likewise attested by the presence of paddy-fields in that direction, viz. on the east side of the Barrackpore road. The drainage of all these places used to pass into those paddy-fields through a number of culverts in the Barrackpore road, and thence to its outfall, the river Hooghly, by means of two khals, viz. Datear Khal and Khurda Khal. Since some years the construction of municipal roads in some of these villages, crossing their drainage channel, the silting up of the drains on either side of the Barrackpore road in consequence of their not being periodically cleaned out, and finally the different culverts in the road having been choked up, the rainfall over those villages cannot find its way into its natural channels of outlet, and is almost wholly absorbed in the subsoil of those villages. As a necessary consequence, all those places are suffering from fever of the malarious type. Any engineer of ordinary intelligence and knowledge of his profession could easily trace the obstructions, and the same, I dare say, may be removed at a small cost. I beg to submit herewith a rough sketch indicating the drainage level of the villages in question.

It is already too late in the season, or I would have also proposed as a trial ground the whole group of villages from Ichapore to Chagda, numbering some 20 or 25, where the fever broke out with the greatest virulence in the years 1860, 1861, and 1862, that is immediately after the construction of the Eastern Bengal Railway embankment; and the different places were affected in the order of time. The embankment in question passed along them in course of its construction, intercepting the drainage of those places in its flow to its natural channels, the bheel Borpotee and the bheel Mothoora.

I take this opportunity to bring to your Honor's notice that, at my recommendation, the Hon'ble Mr. Cockerell issued instructions to the Joint-Magistrate of Serampore some time last year to clear out the drainage of my native village Connoghur, situated within that sub-division, and suffering since some years from this type of fever. The work was taken in hand, but very little progress was made in it, as it was commenced upon rather late in the year. The work, however, has not been since resumed. Dr. Green, the Civil Surgeon of the sub-division, has very attentively studied the drainage condition of the place. I would therefore respectfully beg that your Honor will be pleased to issue necessary orders for the removal, under the supervision of Dr. Green, of the obstructions offered to its drainage.

Calcutta, the 29th April 1878.

Resolution by the Government of Bengal, Financial Department.

READ—

A letter, dated 9th April 1878, from Rajah Degumber Mitter, C.S.I., explaining his views as to the causes of the epidemic fever which from time to time appears in different parts of Bengal, and containing his suggestions for its prevention.

Read again—

Government Circular No. 28, dated 7th August 1877, regarding the improvement of the drainage of towns and villages in Bengal, with a view to preventing the unhealthiness caused by obstructed drainage, and consequent dampness of the subsoil.

The improvement of the drainage of towns and of village sites is a subject to which the Lieutenant-Governor attaches the greatest importance, and in his opinion there is no room for doubt that one, at least, of the chief causes of unhealthiness in Bengal, and of the fevers which in late years have done so much injury and have caused so much misery, suffering, and mortality among the people of large tracts of country, is the excessive humidity of the soil caused by obstruction to drainage.

2. The obstruction is no doubt in some cases caused by roads, railroads, or embankments, and it is the duty of the Magistrates, as well as of all other officers possessing local influence or authority, to see that such obstructions are remedied by the provision of a sufficient amount of waterway by means of culverts and bridges. The value of these culverts and bridges is much enhanced when they are accompanied by drains leading into them constructed along the sides of the obstructing embankment, and when care is taken to secure sufficient drainage on the lower side of the embankment to carry off the water to the nearest bheel or river.

3. But the obstruction to drainage caused by artificial means is of trifling importance in comparison with the natural obstruction caused by the silting up, or destruction in other ways, of old water-courses through which the surplus drainage from the villages flowed to the neighbouring low lands, and the surplus water of these low lands was carried into rivers or other natural outlets.

4. Experience in a number of large stations has lately shown that fever has been not unfrequently brought into such places by an entire indifference on the part of the local authorities and of municipal bodies to the important question of obstructed drainage, and that thereby excessive suffering and mortality have been caused. There is no doubt very great truth in the theory, which has so often and so strongly been insisted upon by Rajah Degumber Mitter, that the natural course of the drainage of Bengal villages is too often overlooked in investigating the causes of outbreaks of fever. The natural condition of that drainage is very correctly described in the following paragraphs of the Rajah's letter of 9th instant:—

"My next enquiry was devoted towards the drainage condition of the fever-stricken villages, as this abnormal dampness must, I concluded, be owing to excessive or unusual absorption of the periodical rainfall in the subsoil of those villages. As nature has blessed or cursed this land with a periodical rainfall of 60 to 70 inches within three or four months, she has also provided it with a beautiful and simple drainage system whereby to get rid of this large quantity of water from the village site. The natural drainage system of of the country, as I have stated on page 5 of the pamphlet, is as follows :—

"'The drainage of all the villages in the epidemic districts, as elsewhere in Lower Bengal, is effected by the water first running into the nearest paddy-fields lying in the direction of their slope; thence it collects in the bheels, from which it rushes through khals into larger streams, which again communicate with navigable rivers. An obstruction occurring in any one of these conduits must interfere with the drainage, and its effects are felt more or less according to the proximity or remoteness of the obstruction from the scene of its influence. Accordingly, it has been found, as will be noticed more particularly hereafter, that the stoppage of the mouths of the different streams has not been productive of such serious consequences to the villages lying within their influence as when the same occurred more in the vicinity of those villages.'

"There is scarcely a single village in Lower Bengal which has not a paddy-field or bheel adjoining, or in close proximity to it, indicating at once which way the slope of the village runs. We also know, as an undeniable physical fact, that the river-bank being high the slope of the villages lying on it is necessarily inland. Bearing these physical peculiarities of the country in mind, one can easily trace, without taking levels or calling in the aid of a professional engineer, whether any obstruction has been offered to the drainage of a particular village in its flow to its natural outfall.

"In prosecuting my enquiry into the drainage condition of some of the fever-stricken villages according to the laws stated above, I found in every instance, not only that obstruction had been offered to the flow of the monsoon water from the village to its natural outlet, but that the virulence of the fever and the interval which preceded its outbreak were regulated according to the proximity or remoteness of the obstruction from the scene of its influence."

5. Under existing laws, Collectors, Magistrates, and municipal bodies have ample powers for dealing with the evil. In the great majority of cases expensive works are not required: very often indeed the expenditure of a few hundred rupees will give relief to thousands of suffering human beings. No doubt it may be urged that, as the money expenditure in most cases would be so small, the sufferers might reasonably be expected to help themselves; but the knowledge which all Magistrates must possess of the habits of the people will satisfy them that associated labour for the public good is not generally to be expected in the present day from native populations. What is required to be done must for the most part be done either wholly or in part by public officers or public bodies.

6. The Lieutenant-Governor relies upon all Commissioners and District Officers to take up this matter in an earnest spirit. It is a subject in which the District Road Committees ought to be able to give much real and useful assistance; and even if their funds cannot be employed on such works, there is no reason why their engineering staff should not render valuable assistance in laying out and devising village drains, since they must often, in the course of their ordinary duties, come upon villages in which a small and inexpensive drain would render a whole village healthy.

7. Another subject which deserves the careful and anxious attention of district officers is the supply of good drinking-water. Where public funds are not available, there will frequently be found men of public spirit ready and anxious to co-operate with the Magistrate in the excavation of tanks, a work which has always been looked upon in India as a work of merit. Large sums of money are expended in this way every year, but it is feared that much of it is wasted by the excavation of tanks in places where they are not wanted, while other places greatly in need of water are overlooked. In respect to the selection of sites for tanks, it is always in the power of the Magistrate to exercise a very useful and beneficial influence on those who are charitably disposed.

8. Whenever a really useful scheme is proposed to improve the drainage, or to provide pure drinking-water, Mr. Eden will always be willing to assist district officers and public bodies by grants-in-aid to enable them to improve the condition of the people, so far as the funds at his disposal will permit. Considerable grants have already been promised this year for this purpose, and no more proper or legitimate mode of expending any surplus which may accrue from the public works cess could be devised.

CIRCULAR No. 15.

COPY, with copy of Rajah Degumber Mitter's letter, forwarded to all Commissioners, except that of the Presidency Division, for information and guidance, and with a request that they will be good enough to report what steps have been taken to carry out the instructions contained in the circular of 7th August 1877, quoted at the head of this Resolution, regarding the improvement of the health of towns and villages by opening out obstructed drainage.

No. 1585.

COPY, with copy of Rajah Degumber Mitter's letter, and the enclosed map, forwarded to the Commissioner of the Presidency Division for information and guidance, with the request that the subject may receive his immediate attention, and that he will be good enough to report what steps have been taken to carry out the instructions contained in the circular of 7th August 1877, quoted at the head of this Resolution, regarding the improvement of the health of towns and villages by opening out obstructed drainage.

By order of the Lieutenant-Governor of Bengal,
RAJENDRA NATH MITRA,
Asst. Secretary to the Govt. of Bengal.

CALCUTTA,
The 29th April 1878.

No. 726S, dated Calcutta, the 23rd September 1879.

From—J. M. COATES, ESQ., M.D., Sanitary Commissioner for Bengal,
To—The Secy. to the Govt. of Bengal, Financial (Sanitation) Dept.

WITH reference to your letter No. 1424, dated the 17th April 1878, I have the honour to state that, on receipt of it, Dr. Harvey issued a circular to all Magistrates, a copy of which is herewith submitted, forwarding a copy of the late Rajah Degumber Mitter's letter of the 9th April 1878, containing his views with regard to the causes of the epidemic fever which appears in Bengal and his suggestions for its prevention, inviting their attention to the subject, and pointing out how, by opening out obstructed drainage at a small cost, the health of towns and villages could be improved.

2. I now beg to enclose abstracts of the replies to this circular that have been received from the district officers. These abstracts contain the practical portions of their reports, and I forward them, instead of the original reports (which can be submitted if required), because the latter are too lengthy.

3. The delay that has occurred in submitting this report is due, in the first instance, to no report having been called for from this department in the original orders on the subject quoted above, and to my having to wait for the replies of several officers, which could not be sent until the local officials and native gentlemen in their respective districts could be consulted on the subject. As it is, I am unable to submit the reports from Mymensingh, Bhagulpore, and Nuddea, as I have not yet received them.

4. Dr. Harvey is much in accord with the Rajah, and considers that "the water-logging of the soil is the chief factor at work in producing the fever" referred to by the Rajah, and that "the main cause of the aggravation of the fever at Dinagepore was the obstruction to the drainage caused by well-meant endeavours to improve it."

5. The Rajah's views in his own words are—"The epidemic is solely due to something in the soil, and the condition most favourable to the development of that something is excessive or abnormal humidity of the subsoil." This view he qualifies by saying that "it is the inordinate humidity of the subsoil of towns and villages, not of the paddy-fields and jullas, which contributes to the outbreak of the fever with epidemic intensity." This statement he also modifies when pointing out the remedy for this condition of things. We find him saying—"To account for the epidemic, you are not therefore to look to the soil of the rice-fields or of the *bheels*, but to that of the villages themselves; and if it is water-logged, the true remedy is to be found in the removal of the obstructions which have been offered to the drainage course of a village, and not in the subsoil drainage. For, however humid or water logged the soil of a village may be, it will, under the scorching sun, but without the aid of any subsoil drainage, be perfectly dry by April, when also the epidemic fever, however virulently it may have been raging, will of itself begin to abate. To prevent a recurrence, we have only to restore the natural drainage of the villages, and they will, without any other treatment, return to their normal condition. In fact the application of subsoil drainage to Bengal with its rainfall of 80 inches, the river full to overflowing during the monsoon, and three-fourths of its arable lands under water, at least during four months of the year, and relying upon it as a sovereign remedy for the eradication of the disease," he scouts as foolish and unreasonable.

6. With regard to the above views, I would submit the following observations:—That in April the villages are freer than at any other period of the year from obstructions to surface drainage, because in a few hours the rains at the vernal equinox sink into the subsoil or run off into the empty pools, tanks, and low grounds, without water-logging the soil. Yet these rains never come all over Bengal without bringing a direct and large accession of fever and ague.

7. By irrigation we absolutely lead water into, and spread it over, the fields within and around villages, yet neither in Shahabad nor in Orissa has an increase of disease resulted by the measure. The Deputy Superintendent of Canal Revenue in the latter place reports that "no actual cases of fever or sickness have come to his knowledge," although he believes that "the moisture is calculated to injure those villages towards which percolation should go from the canals and their distributaries." Again, the inspecting officers of the Education Department and the District Superintendent of Police, who see more of the same district than others, have noted "no outbreaks of sickness from impeded drainage," that is, impeded by canal banks or otherwise.

8. There are innumerable villages all through South and Eastern Bengal to which the remarks of the Joint-Magistrate of Cuttack with regard to Jajipore, viz that, "although

it is a town thoroughly water-logged and without drainage, yet the inhabitants consider it one of the healthiest in Orissa, and malarial fever is extremely rare there," are equally applicable.

9. There are jullas which are not so harmless as the observations of the Rajah led him to believe. I refer to those which remain here and there in the course of old and dried-up river-beds. These "chains of pools," as they are termed, are specially fever-giving, although, as everywhere else, the Europeans who reside near them suffer less than the natives. The former, however, live usually in houses situated in open compounds free from accumulations of filth, use purer drinking-water, and observe healthy habits, although, in the matter of general drainage, they are subject to the same conditions as the natives. Mr. Whitfield had to give up important surveying work in the bheels of the 24-Pergunnahs. He writes—"One assistant engineer died, and surveyors, both Europeans and natives, all suffered severely and were frequently ill with fever, and their men, brought from the surrounding villages, also became ill and refused to remain."

10. But a strong argument against a mere soil-and-moisture theory lies in the fact that, in places where the water is so excessive from inordinate rains or overflow of rivers as to flood and sweep the villages, the following drying season is unusually free from fevers.

This fact the Magistrate of Chumparun, in referring to his experience of the Burdwan fever in Hooghly, has well illustrated. He says—"There is a fall of 80 feet from the Damuda to the Hooghly, the Hooghly district lying between these two rivers, and that therefore the overflow from the Damuda used formerly to flood the whole of the district and actually reach the town of Hooghly, so that the people had to go about in boats. But the embanking of the Damuda and the diminished rainfall of 1874 caused the drying up of the country to begin as early as September and October, instead of late in the cold weather, or even in January and February." The effect was that in 1875 he "saw the whole country dry, and the people obtaining water out of holes in the Saraswati, until the Damuda water was led into that stream that summer to the great relief of the people." Dr. Roy, than whom no one among us had a more intimate and extensive knowledge of the fever which was so general and fatal in Burdwan during the late epidemic there, assures me that the higher villages suffered almost as badly as the low ones, and that the only ones that were so entirely free from the disease that the people of themselves sent their families to them as to a sanitarium were a few which were, during every rainy season, surrounded and flooded by the overflow of the Damuda. The same fact was recorded in the sanitary report of Maldah for the last year. Referring to the fever of the year, the Civil Surgeon writes—"This fever has assumed a new phase in becoming particularly fatal, insomuch that a similitude between it and Burdwan fever has been drawn; and, to account for this change in character, the view has been propounded that, by the silting up of the river Kalindry, the influx of the Ganges water to that of the Mahanunda is so lessened that overflow of the latter river is so trivial as almost to be regarded as a circumstance of the past. This view claims for the inundated water a twofold benefit—*first*, replenishing the tanks; and *secondly*, washing away disintegrating organic matters. This view appears sound in theory and borne out by facts. Since last year the country was little if at all submerged, and fever, in consequence, of a most virulent type, pervaded the district, while during the present year the inundation was considerable, and fever, though nearly as prevalent as during the preceding year, was comparatively innoxious. I am inclined to believe that the washing of refuse matters from the vicinity of dwellings is the great preventive to fever of malignant type, and this I judge on the ground that, immediately below the conflux of the Kalindry and Mahanunda, in the town of old Maldah, and in the villages *Nemaseri*, *Joie*, *Arrahapore*, *Kotwali*, *Dhantolla*, respectively situated on the left and right banks of Mahanunda, all of which were uninundated this year, fever was particularly rife and fatal." The Magistrate adds—"In the tracts lying near or abutting on the Ganges, when those parts of the country that urgently require a good continuous flushing in the rainy season and up to its close were well flushed by the rising of the Ganges in 1878, health has been remarkably good, and there has been an absence of fever, while there has been an epidemic of fever in those parts where these conditions exist, and remained unsatisfied at the proper time.

I myself have found the above facts to be correct over and over again during the last 20 years in this and other districts of Bengal, and all who have witnessed the first overflow through a village and noted the black, brown, green, and yellow color of the water as it passes over drain and cesspit, byre and ditch, and has smelled its most offensive odour, one easily observable some miles below the village, will have seen and felt enough to satisfy them of its good effects.

11. The introduction of river or other fresh water of village tanks, which has been done in Nuddea, Shahabad, Durbhunga, Mozufferpore, and Serampore, has proved distinctly beneficial to the health of the people, although this ought rather to raise the water-level in the soil of these towns.

12. Taking chlorine as the test of water contaminated by excreta—and it is the fairest, because it is the most direct as to cause, and it is the least liable to chemical change—we find that, as recorded by Dr. Warden of Bhagulpore in the last Medical Gazette, the water of the Ganges contained ·347 grains of chlorine per gallon, a well in Mr. Sandys' garden ·994 grains, a well in Sujagunge Bazar 16·4 grains, another by the side of the road in Bengali Tolla 35·03 grains. This is an independent proof that fœcal accumulations affect village wells, while the water in an English gentleman's compound is comparatively free from such impurities, though the places adjoin and the drainage is the same in both, that is, the natural outlets are kept open.

13. Again, the *Sonthals* and the *Polis* suffer little from fever, as compared with the Hindus residing in the villages in their neighbourhood, and the difference does not lie in the drainage nor in the dampness of the houses. Both the former live in straggling huts, never in densely-packed villages. They cultivate the soil up to their housesides, so that when the *makai* is ripe one can only see the roofs of their huts. There are no well-privies inside the houses, and no cesspits, foul drains, human or cattle excreta accumulations around them. All these are common in the Hindu villages, and contaminate air, soil, and water.

14. Take again the strong and vigorous people inhabiting the low lands of Chittagong, Noakholly, Barisal, and the islands of Sundeep, Hattia, and Dukhin Shabazpore, through whose villages I travelled extensively after the cyclone of 1876. These people rarely have fever or spleen, yet the subsoil water is so close to the surface that they cannot dig tanks or wells because the water would be brackish. They generally obtain their drinking water from tanks whose walls are built up by outside cuttings and are made to receive rain-water. When I asked them why they buried their dead on the banks of these tanks, they pointed to the rice-fields and said "if we dig down three feet, we would put our dead in water, and as we plant up to the edge of our *bâris* we have no other dry place." These people have no large villages, and their *bâris* are only four or five houses. Here again we have much moisture and no drainage, but we have small hamlets, extensive cultivation, and little contamination of soil or drinking-water. Our *lascars* are born and bread in these villages, and their physique proves their healthiness.

15. But of all the peculiarities I know of, the one which more directly applies to the subject we are considering, and is the most apt and pointedly important, is the occupation of new lands or *churs*, as they are termed, in these same districts. The khals, which extend in some instances 40 miles inland, as well as the rivers Megna, Pudda, and others, bring down mud and organic debris from the hills and plains of the far interior. These are deposited in long shoals, grass grows, and layer after layer of this clay, sand, and *humus* are added till they are above rainy season water-level. I have over and over again asked the farmers why they do not build and inhabit these churs as soon as they begin to cultivate them, and the unvaried answer was that experience has taught them that, if they did so at first, they would die of fever, but that after they have cultivated the ground for three or five years, they can then build and live on it in health.

Here drainage is again unchanged and, indeed, is impossible, yet the soil is destructive to life until its organic impurities are taken out by a succession of growing plants.

16. The inference from these facts is surely irresistible, viz. that it is not more or less of moisture that is the cause of the evil, but the decomposable impurities of the soil, and that our attention should rather be directed to the latter than the former follows as a thing of course.

17. A word about the drainage of the ordinary Bengali village itself. It is dug out of the common rice-field level of the country. Holes are left owing to the mud of the floors and walls of the huts having been taken from them; tanks are dug also, and when the road has been worn below mean level, it is repaired with earth taken from excavations made alongside, which leave hollows and ditches of irregular width and depth rarely connected with each other so as to form one continuous drain. Now these tanks, cesspits, hollows, and ditches are the drainage reservoirs of the village, and as their deepest parts are below the level of the fields around, they cannot be thoroughly drained away. When the village has become older, and larger wells are dug, in order to save excavations, they are usually begun in one of these hollows or roadside ditches, and as there are well-privies inside the enclosure of the houses for the females, and as the cows are fed outside or in the *angan*, their droppings, the house-sweepings, the cooking fluid refuse, the excreta of children, &c., &c., are cast or flow outside, rise into middins, fill the cesspits, and overflow into the ditches and hollows fouling the wells and tanks, and raising portions of the village soil above field-level, but yet leaving the unfilled hollows still below the ordinary field-level, and in a great measure undrainable into the waterways in the neighbourhood.

18. The Rajah is right when he says we cannot apply subsoil drainage to Bengal, but he might have gone further and noticed that we cannot drain our village pits, hollows, and ditches which are below the level of the fields around. I find that the only removable obstructions to the natural surface drainage of our villages are the uncut portions which have been left between one ditch, hollow or excavation, and another, the growth of weeds in the ditches occasionally, the position of wells in roadside drains, the building of shop verandahs or steps over street drains in towns, and the nets, bamboo-reeds and low ridges put up by men and boys for fishing purposes in the neighbouring waterways.

19. Here I cannot help alluding more prominently to the germ theory of disease, because, if true, it may be that very something in the soil which the able and astute Rajah has surmised to exist; and, if not true, the organic matters on which the germs feed may be the evil in question. At any rate the latter is the evil that I contend must be got rid of.

Mr. Lister prevents live germs getting at a wound, whether accidental or induced, by the interposition of an antiseptic, and he thus quite prevents putridity and septicœmia. But there are so many germs and such various forms of fever that we are yet unable to distinguish which germ is the special source of evil. However, even on this point we are breaking ground and attaining accuracy, for Mr. Lister has already discovered the germs which cause rancidity in milk, and if that one be excluded, though others be present, the milk will decay but not change into lactic acid. M. Posteur, again, has done more. He has separately isolated the germs, be they microzoon or microphyte, which cause carbuncle, which cause putridity of blood (septicæmia), and which cause cholera among fowls. At a recent meeting at Paris he stated that "these maladies exist in the state of germs bottled in my laboratory. At will, during two years for the first two, and for several months for the third, these germs, always ready, can be poured out for new inoculation and new deaths." He adds that he has proved demonstratively that epidemic constitutions do not exist, and that what corresponds to this term is "a greater or less abundance of the germs of the disease."

When I was instructed by Government to set Dr. Wilkie to work on the Burdwan fever enquiry in 1874, I directed him to use the microscope in his investigations, and, doing so, he found the stagnant waters in and around the affected villages swarming with these organisms. The financial pressure that followed the famine of that time stopped the researches, and I can only regret that it has not again fallen to me to push on the enquiry further.

20. If we consider that tons of fœcal and other decaying animal and vegetable matters are daily pumped through the sewers and carted and carried away by rail from Calcutta, and reflect that a like proportion of such matters remains in every village in Bengal, that they are continually accumulating and their decomposition is constantly going on, should we not expect that they or the germs, which feed, grow, and multiply upon them in incalculable numbers, would infect the air and the water, and enter the systems of the people? And may it not be that, when the water is in such excess as to flow through the villages, it carries with it all the soluble organic matters and much of them which are so light as to remain suspended, and that thus the water and the current really scavenge, scour out, and make these villages healthy, notwithstanding the excess of moisture and the fine deposits of organic matters which are left behind? I would just note that, in balancing the undecided question as to which is the more probable cause of these fever-germs or decomposing organic matters, the balance falls to the former. It accounts for a variety in the disease itself, also for the difference of prevalence in one season and year as compared with another, and for the subsidence of an epidemic for years, inasmuch as germs in their growth, development, and abundance vary very considerably, whereas organic matter remains accumulating, and is but little liable to change. Thus the Burdwan fever has gradually abated till it is now of the ordinary type, while drainage and sanitation are unchanged; and a like fever has occurred with Burdwan severity in several other districts, *e.g.*, Maldah, Purneah, &c., which were previously little affected.

21. With regard to the other part of the subject, viz. the obstruction of drainage by roads, &c., causing disease, it cannot be accepted as a proof of this hypothesis that those who were employed in the construction of the Jessore and Furreedpore road died in considerable numbers. The food, the water, and the clothing used by them, and their exposure to sun, rain, and night-chills, to which they were subjected, may have had much to do with the result. At any rate the road is there still, and the villagers residing near it do not specially suffer from fever. The same theory is advanced to account for the mortality among the people who constructed the Grand Trunk Road in, if I remember aright, the Prison Committee's Report of 1839, written, I believe, by Lord Macaulay; but the same fact may be averred to rebut it, viz. that the villagers residing along this road, from Howrah to Lahore, do not since its construction specially die from fever.

I should observe here that agues were very common in England up to recent years, and it might be with truth asserted that this disease disappeared with the increase of roads and railway lines. It may, however, be said that more bridges are made there than in this country. This I cannot admit, for engineers, taught in the same school, have constructed both, and the companies who made the former are not the men to put in one culvert more than they could possibly avoid. But that which has increased, consequent on the construction of roads and railways, is cultivation. To such an extent has this increase been, as not only to take out of the fields the very organic matters I am now commenting upon, but to necessitate the employment in their place of manures and even guano from the antipodes. It is a fair inference, I submit, that the English agues have ceased with the using up by high cultivation of all past and present decaying organic matter or germ pollution. I should note also that these roadways were made and the agues ceased before village sanitation, except this using up of organic matters for manures, was begun in England. The same progress in roads and cultivation is benefitting Italy, so notorious for its agues, although general sanitation in towns is more backward there, and that many of our Indian stations and even the Terai itself have become healthy and are still becoming healthier not from increased drainage, but from extended cultivation.

Returning to Indian roads, I should observe that if any of them have been made with deficient drainage, they would either, as mentioned by the Magistrate of Cuttack, "complacently yield to the floods and disappear," or the accumulated water would remain stagnant, and lean on or lie against the upper side of the road or embankment, and the opposite or lower side of the obstruction would be quite dry and free from water-logging. In my inspection tours I have been careful to note this very point, and to enquire into the comparative health of the people residing on either side of roads which cross the natural fall of the country. I have found the water not lying against them, but collected in hollows below the surface level of the fields, and equally so on both sides of them, and fevers in no instance kept to one side only. It was also a matter of constant remark by many independent observers that the higher villages suffered as severely as the lower ones in all the districts that were affected by the Burdwan fever, nor did it keep to the line of roads in any of the districts from Nuddea to Midnapore, and I have repeatedly found this to be the case elsewhere; moreover, fevers are often worst where there are no roads, as in the Terai.

22. Every officer in the Chota Nagpore Division reports that the natural drainage fall is so great that there is no obstruction, but that, on the contrary, the difficulty is to retain the water for agricultural purposes; and the Deputy Commissioner of Lohardugga says that in this district, fever is not attributed to obstructed drainage, but to the action of the sun's rays on the decaying vegetation of the vast forests in the district, and to extremes of temperature.

23. Considering all the above-mentioned circumstances, especially the facts that we have less fevers after such an excess of moisture as to flood the country; that we have agues where the drainage is excellent, although decaying organic matters are abundant; and that cultivation alone does away with such matters altogether, I confess I am unable to explain the causes of the Bengal fevers, except in the manner above pointed out. I would then advocate that, in addition to removing as far as possible the drainage obstructions already referred to, which may be found in villages, the means of traffic be increased, whether by canals, roads or railways, so that by an extended cultivation, not only for home consumption but for foreign export, all the village organic matters (collected by a proper conservancy from house and public latrines, from middins, drains, and cesspits) may be applied to fields, used up and rendered harmless in the growth of plants; that these hollows, cesspits, &c., be covered over with a layer of fresh earth taken from mounds or high places, if any, or evenly off a neighbouring field, and that the drinking-water be protected from night-soil, kitchen fluids, surface drainage, &c. Improved dwellings, better clothing and sleeping arrangements, and healthier habits of life generally will gradually ensue.

Circular No. 45, dated Calcutta, the 15th May 1878.

From—Robert Harvey, Esq., m.b., Offg. Sanitary Commissioner for Bengal,
To—The Magistrates of 44 districts in Bengal.

I have the honour to forward for your consideration copy of a memorandum by Rajah Degumber Mitter, c.s.i., on the subject of obstructed drainage as a cause of fever, and of a letter from the Officiating Secretary to the Government of Bengal, directing me, if I agree with the views expressed in the pamphlet, to bring the subject to the notice of district officers, and point out to them how much can be done, at small cost, for the bettering of drainage. I have been too short a time in Bengal and have seen too little of the country to commit myself unreservedly to the Rajah's views; but there is sufficient *primâ facie* probability about them to make it worth while to test them practically by removing obstructions to drainage wherever possible. Diminution of fever should, and in most instances would, follow to the clear gain of those living in the neighbourhood.

2. The relation of dampness to fever, and the possibility of eliminating the latter by getting rid of the former, are two of the best known facts in hygienic science, and the Rajah is no doubt quite right in assuming that increased dampness is capable of intensifying the ordinary endemic fever of the country into an epidemic. The great annual rainfall, the general flatness of the country, and the fact that rice, the staple food of the people, requires extensive natural or artificial irrigation, make any general drainage scheme practically impossible, and we can hardly hope to get rid of agues, as has been done in England; but local efforts can do much to improve local drainage and to reduce fever to a minimum. When the ordinary fever of a locality suddenly increases in severity, and it is observed that houses formerly dry have become damp, as seems to have been pretty generally the case where the epidemic fever has been met with, some obstruction to the drainage is certainly pointed to, and wherever that obstruction can be traced to new roads or dams or embankments, means should be taken to obviate the evil by providing sufficient waterway.

3. The Committee recently appointed to enquire into the great prevalence of fever at Dinagepore found conclusive evidence that the main cause of a sudden aggravation of the disease was obstruction to drainage caused by well-meant efforts to improve it. Other causes helped to increase the unhealthiness, as they no doubt do everywhere, but the evidence was irresistible that water-logging of the soil was the chief factor. The Rajah's views as to the leading features of the natural drainage of the country are, I beileve, correct. The drainage line is, as a rule, away from the rivers, the beds of which by repeated deposits of silt are, for the most part, higher than the surrounding country.

4. There seems reason to believe that small local obstructions are frequently caused by landholders interfering with the drainage of villages for agricultural reasons. It would be interesting to know in how many instances these have been followed by increased fever, and whether the fever diminishes after the obstruction is removed, and I shall be greatly obliged by your reporting to me any such instances for or against the theory as may have come or may come to your notice.

5. It would be well if in talking to the native gentlemen of your district you would draw their attention to the subject, and point out to them the good which would probably result to their people if they did their best for the improvement of village drainage.

Dated Calcutta, the 11th October 1879.

From—Baboo Kristodas Pal, Secretary to the British Indian Association,
To—The Secretary to the Government of Bengal, Financial Department.

With reference to the Resolution of His Honor the Lieutenant-Governor, on the subject of improvement of the drainage of towns and villages in Bengal, dated the 29th April 1878, published in the Supplement to the *Calcutta Gazette* for 8th May 1878, I have the honor, by direction of the Committee of the British Indian Association, to submit the following remarks for the consideration of His Honor.

2. Nothing could be more desirable than the instructions of His Honor the Lieutenant-Governor on the subject. His Honor remarks:—

> "The improvement of the drainage of towns and of village sites is a subject to which the Lieutenant-Governor attaches the greatest importance, and in his opinion there is no room for doubt that one at least of the chief cases of unhealthiness in Bengal, and of the fevers which in late years have done so much injury and have caused so much misery, suffering, and mortality among the people of large tracts of country, is the excessive humidity of the soil caused by obstruction to drainage."

His Honor continued—

> "The obstruction is no doubt in come cases caused by roads, railroads, or embankments, and it is the duty of Magistrates, as well as of all other officers possessing local influence or authority, to see that such obstructions are remedied by the provision of a sufficient amount of waterway by means of culverts and bridges. The value of these culverts and bridges is much enhanced when they are accompanied by drains leading into them, constructed along the sides of the obstructing embankment, and when care is taken to secure sufficient drainage on the lower side of the embankment to carry off the water to the nearest bheel or river."

His Honor then went on—

> "Under existing laws Collectors, Magistrates, and Municipal bodies have ample powers in dealing with the evil. In the great majority of cases expensive works are not required; very often indeed the expenditure of a few hundred rupees will give relief to thousands of suffering human beings. No doubt it may be urged that, as the money expenditure in most cases would be so small, the sufferers might reasonably be expected to help themselves; but the knowledge which all Magistrates must possess of the habits of the people will satisfy them that associated labour for the public good is not generally to be expected in the present day from native populations. What is required to be done must, for the most part, be done either wholly or in part by public officers or public bodies."

3. It has, however, been brought to the notice of the Committee that the practical working of the Resolution has not been sufficiently prompt or decisive. The information the Committee have received on the subject is confirmed by the Resolution of His Honor the Lieutenant-Governor on the administration report of the Commissioner of the Burdwan Division, published in the *Calcutta Gazette* of the 24th ultimo. The Committee transcribe the following remarks from the Resolution referred to:—

> "In Hooghly, the epidemic was very severe between August and January. In connection with this serious prevalence of a virulent type of fever, the question of village drainage is of great importance. The attention of all district officers was specially drawn to this by Government Resolution of 29th April 1878, and it was pointed out how much might be done to improve the sanitary condition of the people if Government officers would only interest themselves personally in the matter, and assist the inhabitants in accomplishing the small and inexpensive work which in many cases would suffice to remove the cause of much suffering and death."

The Committee are aware that the attention of district officers is occupied with multifarious matters which scarcely leave them time for attending to a matter of detail like the one under notice. At the same time the importance of this matter, affecting the health and lives of thousands and hundreds of thousands of people in the mofussil cannot be exaggerated.

4. His Honor had directed that the engineering staff of the Road Cess Committee should be employed in laying and devising village drains. The Committee of the British Indian Association are humbly of opinion that perhaps proper attention to village drainage might be best secured if the Road Cess Committees were made responsible for the work. They would have suggested the formation of a separate drainage committee, but, as the multiplication of local committees would not be practically convenient, they are of opinion that those local committees which are already in existence should be utilized.

5. The Road Cess Committee is an organization which, in their humble opinion, is best suited for the purpose under notice. In the first place, the Road Cess Committee has branches in the sub-divisions of the district to which it may belong; in the second place, it has at its disposal an establishment whose work is allied to the improvement of drainage, for the same persons who look at the roads can also look at the drains. If the officers under the employ of the Road Cess Committees be instructed to report upon the drainage of villages in which it may be their duty to construct and maintain roads, much useful information may be acquired, and the requisite improvement may be effected either through their agency or under their supervision.

6. It will not of course be in strict accordance with the provisions of the Road Cess Act to divert any portion of the Road Cess Fund to the improvement of drainage, but funds will be available from four sources, viz. (1) Ferry Fund, (2) the Embankment Fund, (3) the Canal Fund, and (4) the Municipal Fund. His Honor the Lieutenant-Governor has lately ruled that the surplus of the Ferry Fund ought to be applied, among other things, to the improvement of drains. The Embankment and Canal Acts impose upon the authorities concerned the obligation of maintaining the drainage channels intact, while the improvement of drainage is a legitimate charge upon the Municipal Fund.

7. With regard to the Embankment and Canal Funds, there are officers who may execute the necessary works, but the Committee believe they will better realize their sense of responsibility if they see an independent authority vested with the power of reporting upon their work. If the Road Cess Committee be instructed to stir up these officers on the report of their own engineering staff, wholesome activity will doubtless be exhibited. In the same way the Municipal Committee would feel a stimulus if they were made accountable to a District Committee like the Road Cess Committee for their exertions in this direction. It is observable that many municipal committees have no engineering staff of their own, and they will derive material assistance if the engineering establishment of the Road Cess Committee be made available to them.

8. In order to secure proper attention on the part of the Road Cess Committees to the performance of this work, the Committee of this Association would suggest that they should be required to make a quarterly report of progress to the Commissioner of the Division, who in his turn should be directed to make a report to Government. The Road Cess Committee, in order to make the necessary report, should instruct their engineer officers, who are travelling officers, to make a report in detail on the state of drainage in the tract of country through which they may pass, and suggest improvements which, as remarked by His Honor the Lieutenant-Governor in the Resolution under notice, will be generally simple and cheap; the Embankment Department, the Canal Department, or the Municipal Committee, as the case may be, may be called upon by the Committee to execute the necessary works, or deposit with the Committee the estimated cost for such works, who will in that case be able to execute them through their own agency.

9. It might stimulate the Road Cess Committees and other local authorities concerned, and satisfy the public if the Government should be pleased to publish in the official gazette a half-yearly report of progress of the different districts, with such remarks as His Honor may think fit to make thereon.

10. In conclusion, the Committee solicit that His Honor the Lieutenant-Governor will be pleased to take the above remarks and suggestions into consideration, and to issue such orders in the matter as to His Honor may seem meet.

Dated Darjeeling, the 12th June 1880.

RESOLUTION—By the Government of Bengal, Medical and Municipal Dept.

THE Lieutenant-Governor has read with interest the full and able report submitted by Dr. Coates, and the analysis of the district reports submitted by him. Dr. Coates is not disposed to adopt the theory of fever-causation held by the late Rajah Degumber Mitter, and adduces reasons for doubting whether it holds good in Bengal, at any rate in the precise form in which the Rajah usually presented it. He denies that water-logging of the soil can by itself explain the phenomena of the endemic fevers of the country. He inclines to the belief that the true explanation is to be found in the germ-theory of the propagation of diseases of this class, their *nidus* being found in the fœcal and other impurities saturating village sites, and the sole remedy being, in Dr. Coates' opinion, the extension of cultivation and the application of this refuse matter to its proper uses in the manuring of the soil. The Lieutenant-Governor will not attempt to discuss the germ-theory of disease with Dr. Coates, or to estimate the precise value of his arguments. He must, however, observe that there are some facts in connection with the subject which the theory advanced by the Sanitary Commissioner does not seem to meet: thus, for instance, it does not explain the notorious fact that in damp and water-logged districts, like those of Eastern Bengal and Burmah, the people do not die of fever when they sleep on platforms well raised from the ground. Yet the village sites are there as fully charged with organic impurities as those of the most fever-stricken districts of Central Bengal. Then, again, the best cultivated districts of Bengal are those in which the fever has been worst. There is at the same time great force in Dr. Coates' remarks as to the good likely to result from a proper disposal of the refuse matter of towns and villages; but the people are unfortunately not yet alive to the advantages of this.

2. The Lieutenant-Governor is, however, glad to find from the reports received by Government that within the limits of municipalities and unions much has been done, since the issue of the Government orders of August 1877, to improve local drainage and to introduce that improved conservancy to which the Sanitary Commissioner very rightly attaches such great importance. Very much, however, still remains to be done, and the Sanitary Commissioner and local authorities must continue to devote unremitting attention to the provision of effective surface-drainage in towns and villages, to the introduction of a proper conservancy, and to the purification of the supplies of drinking-water. As already promised, if in any case municipal funds are inadequate for the carrying out of really useful schemes likely to do good on a large scale, the Lieutenant-Governor will be ready to consider reasonable applications for assistance. In Dinagepore and Rungpore schemes of drainage have already been started with the help of Government, which are expected very materially to benefit those stations. But, generally speaking, as far as municipalities are concerned, they must be content to advance steadily, though perhaps slowly, in the path of improvement, as their existing means may enable them.

3. In villages not under municipal regulations of any kind, it is impossible to expect much sanitary improvement until the people become more sensible of its advantages. Steps are now being taken to have the rudiments of sanitary knowledge taught in all the primary and other local schools of Bengal; and it may be hoped that, ere many years are past, a great change in feeling and opinion on this subject will come over the mass of the people. Meantime district officers should do what they can to encourage the making of tanks and wells for the supply of good drinking-water, while zemindars and other enlightened members of the native landholding class will often be able, at small cost to themselves, to effect improvements in drainage on their estates to the obvious benefit of their poorer neighbours.

4. In respect of the general improvement of district drainage, the weight of opinion among those consulted is adverse to the suggestion that the District Road Committee should be placed in charge of all such works within the district. Municipal works and works in charge of canal or embankment engineers of the Public Works Department could not certainly be placed under District Road Committees. In the Cess Bill, however, which has recently passed the Bengal Council, power has been given to these committees to spend part of their funds upon "the construction and maintenance of any means and appliances for improving the supply of drinking-water or for providing or improving drainage." This will enable them to initiate and carry out many useful works; and it should be a standing instruction to the district engineer and his staff to lose no opportunity of bringing before the Committee and the Magistrate of the district any obvious obstructions to drainage that may be discovered by them in the course of their ordinary duties. The existing law gives, as has been already pointed out, large powers to the district officer of remedying such evils. There is no reason also why the district engineering staff should not be utilized at times in superintending their removal, so long as this does not interfere with their proper work.

5. For carrying out more extensive schemes of drainage, which involve questions of reclamation, the amended Drainage Act, which has just received the assent of the Governor-General, will provide increased facilities. The Lieutenant-Governor hopes to see large advantage taken of the provisions of that Act, and will, as far as possible, be ready to lend the services of Government engineers for the purpose of examining and developing any likely projects of that class. Meantime the very interesting and suggestive report by Mr. Whitfield on the drainage of the 24-Pergunnahs will be referred to the Irrigation Branch of the Public Works Department of this Government for early consideration. The Government will be ready to give every encouragement to render possible the carrying out of the schemes suggested by Mr. Whitfield, or any part of them declared to be sound. Something has already been done in the way of providing drainage-sluices in the 24-Pergunnahs, partly from Provincial funds, and partly by contributions as for tuccavee works. But the whole subject will now receive careful reconsideration from the Chief Engineer in the Irrigation Department.

6. The reclamation of the Salt Water Lake, to which Mr. Whitfield refers, is a project which the growing prevalence of fever in Calcutta makes it very desirable to see again brought forward. The Lieutenant-Governor would be prepared to support the grant of any reasonable concessions to any substantial Company undertaking this work. Mr. Whitfield is of opinion that all these reclamation projects would amply repay those who carry them out.

7. A comprehensive and costly scheme for improving the water-supply and drainage of the Hooghly district, which has so long suffered from a fatal fever attributable to bad water and the evil effects of blocked drainage and stagnant watercourses, is now being carried out from Provincial Funds; the people of the district having shown themselves unwilling to provide funds for works which are admittedly essential to the preservation of public health in that district. As funds are available, the Lieutenant-Governor hopes gradually to carry out similar schemes elsewhere. The Public Works Department will be requested to examine the reports now submitted from other districts, and to make further enquiries with reference to any projects which appear *primâ facie* to be promising. But generally speaking, it must, as the Lieutenant-Governor observed in the circular of August 1877, rest with local officers and public bodies, or with those directly interested, to bring forward schemes for improvement and reclamation, availing themselves of the powers which have been, or are about to be, given them under the law, and of the aid which the Government is always anxious to afford them.

Nos. 5-7, dated Calcutta, the 18th January 1881.

From—Colman Macaulay, Esq., Offg. Secy. to the Govt. of Bengal,

To—The Commissioners of the Burdwan, Presidency, and Rajshahye and Cooch Behar Divisions.

I am directed to request that you will be good enough to submit an early report, showing what measures have been taken in each district of your Division upon the orders contained in paragraph 4 of Government Resolution of 12th June last, a copy of which was forwarded to you with circular No. 8T of the same date. The Lieutenant-Governor attaches very great importance to the steady prosecution of measures to remove obstructions to drainage, and he desires to know if any special provision has been made for such works by any District Cess Committee, how far the district engineering staff have assisted in bringing obstructions to notice, and generally what action has been taken by the different district officers in the matter.

Dated Calcutta, the 17th May 1881.

RESOLUTION—By the Government of Bengal, Medical and Municipal Dept.

Read again—

Government Resolution, dated the 12th June 1880, on the subject of improving the drainage of towns and villages in Bengal.

Read also—

(1) Letters to the Commissioners of the Burdwan, Presidency, and Rajshahye and Cooch Behar Divisions, Nos. 5-7, dated the 18th January 1881, requesting them to report what measures had been taken in each district of their respective Divisions upon the orders contained in paragraph 4 of the Government Resolution above quoted; whether any special provision had been made for the removal of obstructions to drainage by any District Road Cess Committee; how far the District Engineering Staff had assisted in bringing obstructions to notice; and generally what action had been taken by the different district officers in the matter.

(2) Replies from the Commissioners named.

In the Government Resolution of the 12th June last, quoted in the preamble, the attention of district officers was drawn to the necessity of providing for the general improvement of district drainage, and it was observed that the District Engineer and his staff should be instructed to lose no opportunity of bringing before the District Road Cess Committee and the District Magistrate any obvious obstructions to drainage which they might discover in the course of their ordinary duties. It was pointed out that the existing law gives the district officer large powers of remedying such evils, while District Committees are empowered by the new Cess Act to spend part of their funds upon "the construction and maintenance of any means and appliances for improving the supply of drinking-water or for providing or improving drainage." As regards the more extensive schemes of drainage, involving questions of reclamation, the attention of district officers was drawn to the amended Drainage Act, and it was said that the services of Government Engineers would be lent for the purpose of examining and developing projects of that class. It was added that it would rest with the local officers and public bodies, or with those directly interested, to bring forward schemes for improvement and reclamation, availing themselves of the powers which were given them under the law, and of the aid which Government was always anxious to afford them.

2. Very little appears to have been done in the district of Hooghly, and nothing in Burdwan, to give effect to the orders of Government. The Commissioner states that he proposes to visit these districts shortly, and in consultation with the Collectors, to elaborate a scheme for a systematic inspection of the drainage. His view is that a definite tract of land should be taken in hand each year and thoroughly cleared of all obstructions. The District Engineer should examine the selected tract and submit a scheme to the District Road Cess Committee, which should endeavour to provide funds and carry out the work, aided by subscriptions from wealthy landowners. The Lieutenant-Governor desires that the Commissioner will submit a further report on the 1st January next of the steps taken to improve the drainage.

3. In most of the districts of the Rajshahye and Cooch Behar Division no improvements in the direction indicated have been undertaken for want of funds. But improvements may frequently be made without any large expenditure of money, if the District Engineering staff give advice, and the District Officer endeavours to induce the zemindars and the villagers to take up the work themselves, with or without small contributions from Road Cess Funds. Much good may also be done by the timely removal of fishing dams and other obstructions. Large works can only be carried out gradually; and, as proposed by the Commissioner of Burdwan, selected tracts should be taken up and endeavours made to improve the drainage systematically, the cost being met partly from Road Cess Funds, so far as these can be made available, and partly from public subscriptions.

4. The Rampore Beauleah Municipality have taken steps for the preparation of a drainage scheme for that town. Some obstructions in the Burral river have been brought to notice, and the District Engineer has been called upon to report on the matter. The Lieutenant-Governor considers that the condition of the Burral requires real and serious attention, and he hopes that no time will be lost in devising measures to remove the obstructions in that river.

5. The remarks in paragraph 3 apply to the districts of Nuddea and Moorshedabad, in the Presidency Division. The matter is one to which the Lieutenant-Governor attaches great importance, and he hopes to see more attention paid to it in future. Government will always be prepared to give grants-in-aid of good and well-considered schemes for improving the drainage of populous tracts.

RESOLUTION ON THE EXCISE ADMINISTRATION OF THE YEAR 1880-81.

FINANCIAL DEPARTMENT—EXCISE.

Calcutta, the 15th November 1881.

RESOLUTION.

READ—

The Excise Report for 1880-81.

The only changes in administration made during the year were an increase in the price of excise opium in all districts outside the Patna Division, and the adoption of rules for the importation of *charas* with a duty of Rs. 8 a seer. The year also saw the outstill system further developed and extended.

2. The financial results were very satisfactory. There was an increase of Rs. 13,45,528 in the revenue with an increase of Rs. 997 only in the charges. The following statement shows the progress made by this branch of the revenue of late years :—

PERIOD.	Revenue.	Charges.	Net revenue.
	Rs.	Rs.	Rs.
Average of five years from 1874 to 1879	63,73,043	2,93,390	60,79,653
1879-80	72,09,817	2,65,245	69,44,572
1880-81	85,55,345	2,66,242	82,89,103

Compared with the first period the past year thus shows an increase of nearly 22 lakhs in the revenue with a decrease of over ¼ lakh in the charges. Only four districts, Moorshedabad (Rs. 12,179), Darjeeling (Rs. 2,700), Pubna (Rs. 2,232) and Julpigoree (Rs. 786) show a decrease of revenue in 1880-81 as compared with 1879-80. The largest increase is shown in Gya (Rs. 1,63,654), Patna (Rs. 1,35,774), Bhagulpore (Rs. 1,06,460), Lohardugga (Rs. 91,835) and Calcutta, with Suburbs and Howrah (Rs. 86,305). The following statement shows the gross amount of excise revenue in each division with the incidence on the population. The figures of the recent census have been taken in calculating the percentage for 1880-81. The incidence of the revenue in 1879-80 was thus really less than the figures taken for that year would show.

DIVISION.	Population.	Total revenue.	INCIDENCE PER 100 OF POPULATION—	
			In 1879-80.	In 1880-81.
		Rs.	Rs.	Rs.
Burdwan	7,011,049	8,93,386	10	12
Calcutta, with Suburbs and Howrah	792,546	14,54,949	174	183
Rest of Presidency Division	7,424,986	7,26,428	9	9
Rajshahye and Cooch Behar	7,806,613	5,59,429	7	7
Dacca	7,600,753	5,64,066	6	6
Chittagong	3,336,412	1,99,617	5	5
Patna	13,231,413	20,70,094	11	13
Bhagulpore	7,289,784	11,96,300	13	15
Orissa	3.162,490	4,09,859	12	11
Chota Nagpore	3,146,715	4,81,117	10	11
Total ...	65,958,258	85,55,345	11	14

There was thus an increase of Rs. 3 per 100 of population throughout the province. In the Presidency, Rajshahye, Dacca and Chittagong Divisions the incidence was stationary. There were increases of Rs. 9 in Calcutta and its environs, Rs. 2 in the Burdwan, Patna and Bhagulpore Divisions, and Re. 1 in Chota Nagpore, while there was a decrease of Re. 1 in Orissa. The districts in which the incidence was highest were Patna (Rs. 36), Darjeeling (Rs. 29), Gya (Rs. 23), Lohardugga (Rs. 22), Hooghly (Rs. 20), 24-Pergunnahs and Bhagulpore (Rs. 18) and Maldah and Burdwan (Rs. 17). It was lowest in Durbhunga, Nuddea and Rajshahye (Rs. 5), Jessore, Pubna, Backergunge and Tipperah (Rs. 4), Furreedpore and Singbhoom (Rs. 3) and Noakholly (Re. 1). It is to be observed, however, that both Patna and Gya show a much larger revenue from wine and fermented liquors, including tari and pachwai, than any other district in the province. The revenue under this head was Rs. 90,519 in Patna and Rs. 80,163 in Gya. In only three other districts—Beerbhoom, Mozufferpore, and Durbhunga—did it exceed Rs. 50,000. The incidence of the revenue from spirits in these districts was only Rs. 26 and Rs. 17 respectively for every hundred of the population.

3. The following table shows the share of each division and of Calcutta in the gross increase in the revenue :—

	Rs.
Burdwan	1,32,502
Calcutta with Suburbs and Howrah	86,305
Rest of Presidency	69,612
Rajshahye and Cooch Behar	26,043
Dacca	67,286
Chittagong	40,651
Patna	5,07,291
Bhagulpore	2,32,635
Orissa	12,329
Chota Nagpore	1,60,874
Total ...	13,45,528

The average revenue for every hundred population was Rs. 2 on spirits manufactured after the European method, Rs. 6 from country spirits, Re. 1 from wine and fermented liquors, Rs. 2 from opium and preparations of opium and Rs. 2 from ganja and the like. The different divisions contribute in the following order to the revenue under the three heads of country spirits, fermented liquors and drugs :—

DIVISION.	COUNTRY SPIRITS. Revenue per 100 inhabitants.	DIVISION.	FERMENTED LIQUORS. Revenue per 100 inhabitants.	DIVISION.	DRUGS. Revenue per 100 inhabitants.
	Rs.		Rs.		Rs.
Presidency*	12·9	Patna	2·5	Orissa	9·7
Chota Nagpore	9·4	Burdwan	2	Presidency*	9·6
Patna	9·3	Bhagulpore	1·29	Burdwan	5·5
Bhagulpore	8	Presidency*	1·2	Bhagulpore	
Burdwan	4·9	Orissa	·7	Rajshahye	4·9
Rajshahye	1·9	Chota Nagpore	·2	Dacca	4·4
Dacca	1·6	Rajshahye	·08	Chittagong	4·1
Chittagong	1	Chittagong	·05	Patna	1·8
Orissa	·9	Dacca	·04	Chota Nagpore	1·5
Total ...	6·3	Total ...	1·18	Total ...	4·9

* Including Calcutta.

4. The fluctuations under each head of revenue are shown in the following table:—

ARTICLES.	REVENUE.			IN 1880-81 COMPARED WITH 1879-80.	
	Average of 1874-75 to 1878-79.	In 1879-80.	In 1880-81.	Increase.	Decrease.
	Rs.	Rs.	Rs.	Rs.	Rs.
Country spirits	26,44,783	31,88,851	42,21,299	10,32,448	......
Rum	2,66,624	1,46,789	1,16,796	......	29,993
Imported wines, &c....	99,146	1,29,504	1,67,634	38,130	......
Tari	6,24,897	6,34,739	6,43,557	8,818	......
Pachwai	1,16,273	1,38,812	1,53,996	15,184	......
Charas	2,961	4,547	8,688	4,141	......
Siddhi, sabzi, or bhang	13,386	20,354	26,610	6,256	......
Majum	2,483	2,279	2,578	299	......
Madat	66,054	73,986	81,771	7,785	......
Chandu	18,596	19,324	22,429	3,105	......
Spirits used for arts...	3,580	224	365	141	......
Ganja	12,21,752	12,90,158	14,54,674	1,64,516	......
Opium	12,89,180	15,53,584	16,43,980	90,396	......
Miscellaneous	3,328	6,666	10,968	4,302	......
Total ...	63,73,043	72,09,817	85,55,845	13,75,521	29,993

The past year thus shows a decrease under the single head of *Rum* only, compared with its predecessor. This decrease corresponds with an increase in the competition of Shahjehanpore rum which pays duty to the Excise Department of the North-Western Provinces. Arrangements have now been made to secure a share in this duty for the Bengal revenues. On the expiry of the current five years' financial settlement, all the duty will be credited to this Government. Under all other heads, especially under *Country Spirits*, *Ganja*, *Opium*, *Imported wines*, *Pachwai* and *Tari*, there is an increase. This general increase in the consumption of all exciseable articles was the natural result of the splendid harvests of the two years, and the growing prosperity of all classes of the population.

5. The following statement shows the progress of the extension of the outstill system and the financial results that attended it during the year:—

YEAR.	SHOPS.			REVENUE FROM FEES AND LICENSES.		
	Sudder distillery.	Outstill.	Total.	Sudder distillery.	Outstill.	Total.
				Rs.	Rs.	Rs.
1879-80	902	4,981	5,883	13,75,092	18,13,759	31,88,851
1880-81	627	5,657	6,284	11,81,717	30,39,582	42,21,299

The sudder distillery system was entirely withdrawn during the year from the Rajshahye and Cooch Behar, Dacca, Chittagong and Patna Divisions and from Purneah, Manbhoom and Singbhoom. The general results are satisfactory, and as a rule the outstill system was introduced with discretion and good judgment. But an examination of the returns leaves no doubt that in some instances the District Officers took an erroneous view at once of the interests of the revenue and of the interests of the people. The outstill system has been shown by experience to be the only system that can be worked with success in the present condition of Bengal. But to ensure what is more important than mere financial success, and to prevent a recurrence to a state of things almost as unsatisfactory as the sale of illicit liquor at nominal rates under the sudder distillery system, it is essential that the points referred to by the Lieutenant-Governor in his Resolution on the last report should be constantly kept in view. Sir Ashley Eden there said:—"It is very necessary that District Officers should be on their guard against allowing an undue multiplication of shops at unduly low rates, and thus both reducing the price of spirits and giving unnecessary facilities for obtaining it. If, however, they exercise care in selecting the sites for shops, and stimulate a healthy competition among the bidders for licenses, there can be little doubt that, as has been the case under the fixed duty system, the revenue paid to Government and the price charged to the public will rise with the desire and power of the public to purchase." It is only by confining the number of shops and stills to the genuine wants of the district, fixing a substantial upset price and encouraging competition among candidates for licenses that the price of liquor can be kept at rates sufficiently high to act as a check on consumption. These considerations certainly received little weight from some District Officers in making the settlements for 1880-81; and the Lieutenant-Governor now learns with regret that they have in some districts been set aside with the sanction of the Board, even in making the settlements for 1881-82. In Bankoora the number of shops was increased from 190 in 1879-80 to 273 in 1880-81, or from 1 shop for every 5,097 inhabitants to 1 for every 3,824. In fact, with the exception of Darjeeling, where there was also some undue multiplication of outstills and where the circumstances are special, the number of shops was greater in Bankoora in proportion to the population than in any other district in the province. At the same time the maximum fee paid for a license was much smaller than in any other district outside Orissa, where the consumption of country spirits is insignificant. In Monghyr the number of shops was 478, or one for every 3,967 inhabitants, in 1879-80. This was increased to 493 in 1880-81, while the highest fee paid for a license fell from Rs. 5,472 to Rs. 3,324. In Gya the number of shops was increased from 482 to 493, and in Patna from 303 to 364. The Lieutenant-Governor is willing to allow that in districts containing sparsely inhabited tracts it is impossible to adhere to rules regarding the proportion of shops to population which may be appropriate elsewhere: but he can see no good ground for such a multiplication of shops as has been allowed in the districts abovenamed. In Darjeeling and Maldah, and apparently in Burdwan and Lohardugga, the number was also unduly large. It is reported that the orders given in the last Resolution have been generally attended to in fixing the settlements for the current year, and that a decrease of 683 has been made in the number of outstills in 12 districts, while in most cases this has been attended by a considerable increase of revenue. In Gya 205, in Patna 114, in Sarun 66, in Beerbhoom 58 and in Darjeeling 23 out of 45 have been closed, while the average monthly fee per outstill has risen in Patna from Rs. 101 to Rs. 158, in Gya from Rs. 56 to Rs. 154, in Sarun from Rs. 43 to Rs. 78 and in Darjeeling from Rs. 58 to Rs. 142. This is precisely the result which the Lieutenant-Governor foresaw in urging District Officers to guard against an undue multiplication of shops. In the settlements of some districts, however, the clear injunctions of Government appear to have been altogether disregarded. In Monghyr the number has only been reduced from 487 to 434, in Bhagulpore from 290 to 256, and in Maldah from 155 to 126, while in Bankoora no reduction has been made. It is stated that it was only on the strong remonstrance of the Collector of Bankoora that the Board allowed their original orders for a reduction of shops to remain in abeyance, and that in sanctioning the reduction in the other districts named they similarly acted on the representations of the local officers. The Board, as now constituted, express regret that larger reductions were not insisted upon. The Lieutenant-Governor shares the regret of the Board, and he desires that the grounds on which the Collectors of Bankoora, Monghyr, Bhagulpore, and Maldah obtained permission to contravene the orders of Government may be fully reported. The Lieutenant-Governor trusts that, in making the settlements for 1882-83, the principles laid down in the Government orders last year will be carefully observed. The Board should specially report to Government the settlements sanctioned for these four districts.

6. On the other hand it is quite clear that in the Rajshahye and Cooch Behar, Dacca, Chittagong and Orissa Divisions, and also in the Jessore and Nuddea districts of the Presidency Division, there is room for an increase in the

number of outstills. The average population to each outstill is 44,164 in Chittagong, 30,878 in Dacca, 25,935 in Rajshahye and Cooch Behar and 32,998 in Jessore. The continuance of illicit distillation in some of these districts plainly shows that there is a want which may be legitimately supplied by a judicious increase in the number of shops. The Board specially refer to the case of Dinagepore, where the police in the course of an ordinary investigation found illicitly distilled spirits in 18 houses in one village. Dinagepore now contains 76 outstills, with an average area of between 30 and 40 square miles each. Under the old system there were only 49 shops, supplying an average area of between 50 and 60 square miles each, and the Board justly observe that "it can easily be imagined to what extent illicit distillation must have formerly flourished, when, with a diminished area to be supplied by each shop, and with a distributing agency directly interested in the suppression of illicit dealings, it is still carried on to the serious extent indicated by the instance mentioned by the Commissioner."

7. It should be recognized as one of the first duties of a Collector to be thoroughly acquainted with the requirements of his district in regard to excise. The Lieutenant-Governor presumes that each Collector has a special map on which the position of each outstill is marked. A copy of such a map should be submitted to the Board with the proposals for the year's settlements. The map should be marked off into squares of ten miles, and this will at once show whether there is a tendency to allow too many shops to be established in the same part of a district. Where a recommendation is made for the establishment of outstills in the neighbourhood of one another, the circumstances of the case should be fully explained. It is the establishment of these clusters of outstills that is most likely to reduce the price of liquor by causing the distillers to compete with one another for the custom of the consumers. The object of District Officers should be to encourage competition, not among those who have obtained, but among those who are seeking to obtain, licenses; not among those who actually sell the spirit, but among those who are desirous of acquiring the right to sell spirit in a certain locality.

8. The question of the effect of the outstill system in encouraging the consumption of liquor has been very fully discussed by the local officers. The Lieutenant-Governor finds that in a few districts, such as Bankoora, Gya and Patna, where the system has been mismanaged in the face of the orders of Government, some increase in drunkenness among the labourng classes is reported. This is the result that must ensue where shops are multiplied and let for small fees. The dealers compete among themselves for the custom of consumers instead of being compelled to compete for the original right to sell, and they are enabled to sell spirits at low rates because they have low rates of fees to pay to the State. Precisely the same result would ensue under the sudder distillery system if shops were scattered in clusters over the country while the rate of duty was reduced to a minimum. It is a result which is independent of the system under which it is allowed to occur. In those districts, however, —and the Lieutenant-Governor is glad to say that they form the large majority —where the outstill system has been managed with discretion, and where the orders of Government have been strictly obeyed, the results have been very different. Illicit distillation has been suppressed and the interests of the State are protected, while the people are supplied with a wholesome weak spirit at reasonable rates. That a larger actual quantity of this weak liquor is consumed there can be no doubt, but there is nothing whatever to show that the consumption of alcohol has increased, beyond the normal increase which always takes place when the people have money to spend on luxuries, or that drunkenness has been in any way promoted by the outstill system. The Collector of Hooghly says: "As we must provide some form of intoxicating liquor, I prefer the cheap outstill brew to the concentrated spirit that leaves only sudder distilleries, and from a moral point of view, I no more regret the result than I would the consumption of a hogshead of cyder in place of a gallon of whisky." No comparison can be made between the quantity of spirits actually consumed under the two systems. The accounts kept by the distillers cannot be taken as accurate, and the strength of the two classes of liquor is different. Nevertheless the Lieutenant-Governor has no doubt that the people have actually spent more money on

drinking during the past two years than they did before. This again, however, is a result which would have occurred altogether apart from any change in system. Evidence of the increased expenditure on exciseable articles presents itself on all sides, and the increased spending power of the people is shewn equally in larger sales of the ordinary articles of commerce. Notwithstanding the competition of outstill liquor, the quantity passing into consumption from such sudder distilleries as remain has shown a steady increase. In Calcutta and the Suburbs with a decrease of seven shops it rose from 161,465 gallons in 1879-80 to 173,342 gallons in 1880-81. In Hazaribagh, while the number of shops was constant, it rose from 34,871 to 43,750, and in Lohardugga, with a decrease of one shop, from 17,619 to 20,149. Here is unmistakeable proof that people who are *not* supplied from outstills have more money to spend on spirits and that they will thus spend it. The Lieutenant-Governor sees no ground for supposing that the people of the rest of the country have different tastes. That this is not the case is shown by the increase in the consumption of other articles of excise. The people have spent more money on ganja, on opium, on imported wines, on pachwai, on tari, on madut, on siddhi, on charas, and on majum. The case of rum, as has already been explained, is special. Under every other class of excised articles more money has been spent than was spent in 1879-80, and the Lieutenant-Governor sees no reason why country spirit should be an exception.

9. There remains the question of the quality of the spirit offered for sale at outstills. It is admitted that the illicitly distilled liquor which was largely consumed under the sudder distillery system was generally adulterated. Some persons, however, have asserted that the outstill liquor is of even a worse character, and the Lieutenant-Governor has desired the Board to obtain samples from several districts through reliable agency and to have them analysed. Meanwhile, one gentleman has recently been good enough to supply Government with two samples of what he believed to be a "wretched concoction which is drugged and corrupted with all manner of cheap and nasty narcotics." A bottle of this spirit was said to be capable of making two men drunk, and it was added that it not only produced intoxication, but brought on excessive thirst, "a feeling of langour," and "a severe headache." In consequence, apparently, of the symptoms it produced, it was declared to contain *nux vomica* and dhatura. The Lieutenant-Governor has had these samples tested by the Chemical Examiner, and the following is an extract from the report received from Dr. Warden:—

> "The bottles contained 112 c. c. each of slightly turbid fluid, acid in re-action, and which had the characteristic odour of mahwa spirits. The contents of No. 1 bottle yielded on distillation 10·96 and No. 2 bottle 13·43 per cent. of London proof spirit by volume. Copper and the active principle of dhatura, *nux vomica* and aconite were especially sought for, but with negative results. The solid residue after removal of alcohol from 200 c. c. of the mixed liquors was injected into a cat's stomach without causing any symptoms. * * *
>
> "Regarding the question of adulteration of country liquor, poisonous drugs, *e.g.* *nux vomica*, dhatura, &c., are sometimes used in the manufacture, but as far as I have been able to ascertain, the admixture is made either *during the fermentation of the mahwa* or *during the distillation of the liquor*. With some exceptions the active principles of poisonous vegetable drugs are non-volatile at the temperature of boiling water, and the active principles of *nux vomica*, dhatura, aconite, &c., belong to this class, the result being that, although these drugs may be added to the contents of a still during distillation, yet the distilled liquor will be found harmless. Obviously the addition of dhatura, &c., to liquor after it has been distilled would render its poisonous.
>
> "I believe the only adulterant purposely added to country liquor is *water*."

This analysis entirely bears out the opinion already expressed by this Government after careful enquiry in various parts of the country. The Lieutenant-Governor sees no reason to disbelieve the general report that outstill liquor is more wholesome than the concentrated spirit manufactured at sudder distilleries, and that it is only adulterated by the addition of water.

10. The revenue from country-made *Rum*, as has already been observed, showed a decrease of Rs. 29,993. The number of wholesale and retail licenses issued was only 154, against 161 in the previous year; but the amount realized from fees was Rs. 38,334, against Rs. 35,397, the collections for the year including fees which would have been paid in 1879-80 had not the settlements been delayed by a combination among the vendors. The collections

on account of duty amounted to Rs. 78,462 only, against Rs. 1,11,392 in 1879-80 and Rs. 2,00,546 the average of the years 1875—80. This is chiefly the result of the competition of Shahjehanpore rum. The quantity of this spirit imported has been 20,476 gallons in 1878-79, 22,798 gallons in 1879-80, and 25,338 gallons in 1880-81. After the close of the current year all the duty will be credited to the Bengal Government.

11. The total number of licenses, wholesale and retail, for the sale of *Imported liquors* was 931, against 834 in 1879-80. The increase in the revenue from fees was still larger,—from Rs. 1,29,504 to Rs. 1,67,634. This points to increased competition under the auction system resulting from brisker trade. The duty on these liquors is credited to the Imperial Treasury as Customs revenue. The amount realized in each year on liquor actually passing into consumption was—

		Wine and liqueurs.	Spirits.	Beer, &c.	Total.
		Rs.	Rs.	Rs.	Rs.
1879-80	...	2,52,022	9,71,282	30,262	12,53,566
1880-81	...	2,56,406	10,37,750	30,594	13,24,750

12. The revenue frem *Tari* is entirely derived from license fees. The number of licenses issued was 25,562 against 21,578 in 1879-80, and the revenue realized amounted to Rs. 6,42,899 against Rs. 6,33,617. The increase was most marked in the Dacca Division, where the number of licenses for unfermented tari rose from 3,079 to 6,827. There was also a satisfactory increase from 334 to 748 in Tipperah. The Board properly give credit to the local officers for this result, and they are of opinion that when the tari-tappers are made acquainted with the law and the rate of fee, there will be no difficulty in obtaining a further increase.

13. The number of *Pachwai* licenses was 2,034 against 2,066 in 1879-80, but the revenue from fees increased from Rs. 1,38,812 to Rs 1,53,996. In some districts competition produced a large increase in the revenue from fees with very little increase, and in some even with a decrease, in the number of licenses issued. Thus in the Sonthal Pergunnahs only three new licenses were issued, but the revenue from fees rose from Rs. 11,165 to Rs. 16,254. In Beerbhoom the number of shops was reduced from 475 to 450, but the revenue from license fees rose from Rs. 43,557 to Rs. 54,078. The Board observe that the increase in Beerbhoom was due to the transfer of shops from Moorshedabad. This is not clear. A decrease in the number of shops and the revenue is shown in Moorshedabad, but there has also been a reduction in the number of shops in Beerbhoom, as shown above.

14. The *Ganja* crop of the year was much more plentiful than in either of the two previous years, and the result was a considerable fall in prices. There was an increase in the number of shops, from 3,210 to 3,411; in the quantity consumed, from 5,137 maunds to 5,600 maunds; in the revenue from license fees, from Rs. 5,28,669 to Rs. 6,26,557; and in the revenue from duty, from Rs. 7,61,489 to Rs. 8,28,117. Altogether the increase in the revenue amounted to Rs. 1,64,416. The increase was very general throughout the province, but was most marked in the Patna, Bhagulpore, and Dacca Divisions, and there can be no doubt that this has been in great measure the result of the prosperity and increased spending power of the people. In the Bhagulpore Division, with an actual decrease in the consumption, the revenue shows an increase of Rs. 24,333, and this has entirely resulted from the enhanced sums offered at auction for licenses, which must have gone to increase the selling price of the drug.

15. The Lieutenant-Governor considered that the time had come for a general increase in the selling price of *Excise Opium* in all but the producing districts, and accordingly in October 1880 he sanctioned a scheme submitted by the Board to raise the rates by sums varying from Re. 1 a seer in Chota Nagpore to Rs. 3 a seer in Orissa. The result has been some decrease in the consumption and a large increase in the revenue. There has also been a considerable increase from license fees owing to enhanced competition among the vendors, and the general result has been a considerable increase in the selling price to consumers. Notwithstanding this, the Dacca division shows a small increase in consumption, from 98 maunds to 101. The quantity, however, is still considerably below the average of the previous five years; and, looking

to the habits and condition of the population, the Lieutenant-Governor has little doubt that illicit dealings in opium are very common in this division The decrease from 30 maunds to 25 maunds in the Patna division seems to indicate smuggling on a large scale, and the account given of the working of the farming system, particularly in Mozufferpore, where "opium-eaters, who abound, did not seem to feel any inconvenience" from the closure of the solitary opium-shop, shows a condition of things which the local officers, with the special establishment, must do something to correct. The Board have acted judiciously in sanctioning substantial rewards for the detection of the important cases of smuggling related in the report; and the Lieutenant-Governor desires that this policy may be steadily continued. He will also be prepared to entertain proposals for strengthening the special detective establishment.

16. The number of arrests for offences against the excise laws was 4,296, against 3,897 in 1879-80 and 2,442 in 1878-79. The number of persons convicted was 3,627, against 3,285 and 2,442 respectively.

17. The Board are of opinion that the police of Midnapore, Beerbhoom, Calcutta, Chumparun, and Monghyr, and the excise officers of Calcutta, Dacca, Sonthal Pergunnahs, Tipperah and Furreedpore, are most deserving of commendation; while the police of Manbhoom, Bhagulpore, Rungpore, Durbhunga and Burdwan, and the excise officers of Darjeeling, Julpigoree. Noakhally, Beerbhoom, and Balasore, were specially wanting in their duty, The police of 24-Pergunnahs, Gya, and Jessore appear to have devoted themselves too exclusively to the detection of petty irregularities by licensed vendors,—in fact to worrying those on whom they can readily lay their hands,—and too little to their legitimate preventive duties. They would do more good by detecting 5 "other persons" in smuggling than by bringing 100 licensed vendors to justice for petty irregularities. The Lieutenant-Governor fully endorses what the Commissioner of the Presidency Division and the Board say regarding the power of District Superintendents to cause their police to do good excise work if they will only themselves display an interest in it. In the last Resolution the Lieutenant-Governor requested that District Superintendents might be warned that the names of those shown to have neglected their duty in this respect would be specially noted in future. A note will now be taken in the Appointment Department of the names of the District Superintendents of Manbhoom, Bhagulpore, Rungpore, Durbhunga, Burdwan, Noakhally, Maldah, Dinagepore, Pubna, Jessore, Rajshahye, Mozufferpore, and Singhbhoom, who have been selected for unfavourable mention. The fines inflicted amounted to Rs. 53,233, against Rs. 44,915 in 1879-80. Altogether Rs. 39,038 was disbursed as rewards, against Rs. 25,636 in the previous year, and the Lieutenant-Governor is glad to learn that, except in Midnapore, the rewards were promptly distributed. A reward in such cases loses a great part of its effect if it is long delayed.

18. The Board bring to notice the good service rendered by Excise Inspectors Jaga Mohan Bhattacharjee of the Dacca Division and Baboo Prokash Chunder Roy of the Patna Division, and the Lieutenant-Governor desires that his acknowledgments may be conveyed to these officers. The second Inspector of the Patna Division, Moonshee Mujeebar Rahman, appears, as the Board observe, to have entirely mistaken the object of his appointment, and to have confined himself to such proceedings against vendors as have been condemned in the Police of 24-Pergunnahs, Gya and Jessore. It is not clear why the Commissioner did not give the Inspector some instructions at the outset of his career. The names of the officers mentioned by the Board as having devoted special attention to excise will be communicated to the Appointment Department. The Lieutenant-Governor desires to thank the Board for the careful report in which the administration of the year has been reviewed.

By order of the Lieutenant-Governor of Bengal,

COLMAN MACAULAY,

Offg. Secretary to the Govt. of Bengal.

Rainfall, Weather, and State and Prospects of the Crops.

Statement showing Rainfall, Weather, and State and Prospects of the Crops in the different Districts of Bengal, as reported to Government during the week ending the 12th November 1881.

	No.	District, and date of return.	Rainfall at Sudder Station in inches.	Character of the weather, state and prospects of the crops, and state of health at date.
		BENGAL.		
		Western Districts.		
BURDWAN DIVN.	1	Burdwan, Nov. 12 '81 Raneegunge ...	Nil A few drops.	Weather—fair and cool. Prospects of *amun* paddy continue to be good. Some paddy on higher lands has been injured for want of rain. Fever raging violently in Cutwa and prevalent elsewhere. Rice selling from 22 to 30 seers per rupee.
	2	Bankoora, „ 12 „	Nil	Weather—seasonably cold. Paddy in high lands slightly suffering from want of rain, and artificial irrigation has been resorted to in places where water is available for the purpose. Sowing of winter crops still going on. Fever prevalent throughout the district
	3	Beerbhoom, „ 12 „	0·02	Weather—dry at present. Some rain fell in the course of the week. Sowing of cold-weather crops begun. Rice promising well. Harvesting of *aus* begun. Prices of food-grains moderate. A very sickly season. Fever prevalent throughout the district.
	4	Midnapore, „ 12 „	Nil	Weather—dry and cool. State and prospects of crops excellent, excepting in some low and flooded tracts. Prices low. Fever very prevalent as before throughout the district.
	5	Hooghly, „ 12 „	Nil	Weather—bright and clear. Prospects of *amun* rice generally good throughout the district. Sugarcane and cold-weather crops promise well. A few cases of cholera in Serampore and Jehanabad.
		Howrah, „ 14 „	Nil	Weather—getting cold. State and prospects of crops continue fair on the whole.
		Central Districts.		
PRESIDENCY DIVN.	6	24-Pergunnahs, Nov. 15 '81	Nil	Weather—seasonable. Prospects of *amun* rice continue very favourable, and harvesting of it has commenced. Sowing of winter crops going on, but rain wanted. Public health generally good. Fever appears to be increasing in Sudder, Baraset, and Satkhira sub-divisions.
	7	Nuddea, „ 12 „	Nil	Weather—cool at night and morning, but hot in afternoon. Prospects of *amun* favourable. In Kushtea sub-division *amun* being harvested. Sowings of winter crops still continue. Fever prevalent throughout the district.
	8	Jessore, „ 12 „	Nil	Weather—seasonable *Amun* crop excellent Rain wanted for winter crops. Fever prevalent as usual at this season.
	9	Moorshedabad, „ 12 „	Nil	Weather—seasonable In some places cutting of *amun* begun. Cold-weather crops being sown. Fever still prevails. No report received from Kandi.
RAJSHAHYE AND COOCH BEHAR DIVN.	10	Dinagepore, Nov. 11 '81	0·04	Weather—seasonable. Prospects of crops good.
	11	Rajshahye, „ 12 „	0·06	Weather—seasonable; sometimes cloudy. *Amun* paddy continues good, but wants rain. Sowing of spring crops going on. Price of rice stationary. Fever general throughout district, though not often fatal. One case of cholera reported from Putya station.
	12	Rungpore, „ 12 „	0·10	Slight rain at head-quarters only. Late rice promises well. Potato, wheat, tobacco, and mustard crops being sown. Sugarcane, ginger, and turmeric doing well. Fever prevalent.
	13	Bogra, „ 12 „	0·06	Weather—cloudy at beginning of week, since very fine and warm. Prospects of all crops very fair. Fever lessening.
	14	Pubna, „ 12 „	Nil	Weather—fine and moderately cool with some cloudy days. Cutting of rice has begun. Winter crops doing well. Fever about, particularly in Doolay thana, where several deaths have occurred. One or two cases of cholera reported.
	15	Darjeeling, „ 12 „	0·90	Weather—getting cooler and sky clouded. Crops doing well. Public health good.
	16	Julpigoree, „ 12 „	1·35	Weather—on 6th, 7th, and 8th sky cloudy and there was slight shower of rain. Up to date sky clear. *Haimanti* rice prospering. Transplanting of tobacco going on. Cutting of jute finished. General health good.
		Cooch Behar, „ 11 „	Nil	Weather—seasonable; cold season setting in. Late rice just flowering. Sowing of mustard seed and transplanting of tobacco seedlings going on. Rice selling at Rs. 2-6 per maund. Public health generally good.
		Eastern Districts.		
DACCA DIVN.	17	Dacca, Nov. 12 '81	Nil	Weather—seasonable. Harvest of early rice continues. Prospects of late rice good Pulses, *til*, and mustard being sown. Cutting of jute completed; outturn good.
	18	Furreedpore, „ 12 „	Nil	Weather—seasonable; getting cold. State and prospects of crops very good. Some bad fever about, but, generally speaking, public health good.
	19	Backergunge, „ 10 „	0·10	Weather—fair. Prospects of rice crop and sugarcane good Fever reported in Patuakhali sub-division. Health of people generally satisfactory
	20	Mymensingh, „ 11 „	Nil	Weather—dry and seasonable. Prospects of crops throughout the district good. A little rain needed in Jamalpore.

	No.	District, and date of return.	Rainfall at Sudder Station in inches.	Character of the weather, state and prospects of the crops, and state of health at date.
		BENGAL.—(*continued.*)		
		Eastern Districts.—(Continued.)		
CHITTAGONG DIVN.	21	Chittagong, Nov. 15 '81	Nil	Weather—seasonable. Harvesting of *amun* begun. Small-pox and cattle-disease still reported. General health good.
	22	Noakholly „ 10 „	0·11	Weather—cool and pleasant. *Amun* paddy progressing well. Earlier sorts—*rajashail, lemburi*—being cut. Pulses and oilseeds being sown.
	23	Tipperah, „ 11 „	Nil	Weather—fair. State and prospects of crops generally favourable.
		Brahmunberiah ...	0·27	
		Chandpore ..	0·35	
	24	Chittagong Hill „ 7 „ Tracts.	0·3	Weather—cloudy and warm during early part of week; now getting more settled Gathering of cotton and *til* in full progress Plough paddy and sugar-cane doing well. Land nearly ready for cold-weather crops. General health much improved.
		Hill Tipperah, „ 9 „	0·26	Weather—seasonable. State and prospects of crops continue to be favourable. Public health good.
		BEHAR.		
PATNA DIVN.	25	Patna, Nov. 12 '81	Nil	Weather—seasonable. Sowing of *rubbee* and poppy continues. Paddy promises a good harvest. A few cases of fever reported from Behar sub-division.
	26	Gya, „ 12 „	Nil	Weather—cool. Paddy ripening and will be ready for harvest in a few days. *Rubbee* sowings still going on. Fever more or less prevalent all over the district.
	27	Shahabad, „ 12 „	Nil	Weather—fine. Prospects of *aghani* rice continue excellent. *Rubbee* sowings being pushed on Fever still prevalent throughout the district
	28	Durbhunga, „ 12 „	Nil	Weather—cool. Prospects of *aghani* rice crop satisfactory. *Rubbee* already sown has germinated well. Prices stationary. Fever still prevalent.
	29	Mozufferpore, „ 12 „	Nil	Weather—seasonable. Prospects of rice crop continue very good. *Rubbee* sowings nearly completed.
	30	Sarun, „ 12 „	Nil	Weather—cool and bright. Prospects of crops favourable. *Rubbee* being sown. Fever abating.
	31	Chumparun, „ 12 „	Nil	Weather—seasonable. Prospects of *bhadoi* excellent. Rice is in good order. Fever prevalent.
BHAGULPORE DIVN.	32	Monghyr, Nov. 12 '81	Nil	Weather—clear and fine. Prospects of crops continue very favourable. Fever stated to be prevalent in some parts of the district.
	33	Bhagulpore, „ 12 „	Nil	Weather—cloudy and rather warm for the season. There will be a full rice harvest. Prospects of cold-weather crops good. Public health fair. Some fever and small-pox.
	34	Purneah, „ 12 „	Nil	Weather—not yet seasonable. Prospects of *rubbee* crops good *Aghani* rice being reaped. Fever still prevalent.
	35	Maldah, „ 12 „	0·05	Weather—cold at night and in morning, but very hot in day for this season. A few drops of rain fell on two occasions in middle of week, followed by a fog on 9th. Weather six degrees warmer now than at this time last year. Prospects of late rice and *kalai* favourable Cold-weather crops being sown and coming up throughout district. Common rice sells at from 25 to 30 seers a rupee. Fever continues, but abating. General health fair.
	36	Sonthal Perghs. „ 12 „	Nil	Cloudy and drizzling weather, succeeded by bright clear sky. State and prospects of crops good. Fever still bad.
		ORISSA.		
ORISSA DIVN.	37	Cuttack, Nov. 11 '81	Nil	Weather—seasonable. Prospects of crops on high lands bad for want of rain which is urgently wanted throughout the district. Rice sells from 12 to 29 seers per rupee. Cholera and fever reported from some parts of the district.
	38	Pooree, „ 10 „	Nil	Weather—seasonable In Khurda sub-division low land crops suffering from some sort of blight and harvest will very likely be poor. In Sudder crops doing very well. A 12-anna outturn in the district expected.
	39	Balasore, „ 11 „	Nil	Harvesting of early rice in progress. Want of rain, from which late rice is likely to suffer to a great extent, is supposed to have begun to tell upon the market, the price having risen from Re. 1 to Rs. 1-4 per maund. The sudden rise, however, is probably partially due to the influx of rice merchants, who annually export rice very largely from this district. Some of them have commenced purchasing the old stock. *Rubbee* sowings retarded by want of moisture. On the whole, apprehensions entertained of a bad season if no rain falls shortly. Fever continues in northern parts, and cattle-disease in head-quarters sub-division.
		CHOTA NAGPORE.		
		South-West Frontier Agency.		
	40	Hazaribagh, Nov. 12 '81	Nil	Weather—seasonable. Harvesting of rice still going on. Prospects of *rubbee* good, but rain wanted for the same. General health good.
	41	Lohardugga, „ 12 „	Nil	Weather—seasonable. Cold-weather crops promise well. Fever abating in Palamow. Cattle-disease has appeared in Baresand.
	42	Singbhoom, „ 11 „	Nil	Weather—still warm during the day, but cool at nights. Harvesting in active progress all over the district. Rice everywhere excellent. All other crops also promise well. Fever very general.
	43	Manbhoom, „ 12 „	Nil	Weather—first three days cloudy ; rest of the week seasonable. Reaping of rice harvest going on. Prospects of dry-weather crops good. Fever raging at Begoonkondar. A few cases of small-pox at Raghunathpore union.

Published for general information.

CALCUTTA, STATISTICAL DEPT.,
The 15th November 1881.

COLMAN MACAULAY,
Offg. Secy. to the Govt. of Bengal.

Results of the Meteorological Observations taken at the Alipore Observatory from 6th to 12th November 1881.

Month.	Date.	Maximum in sun.	Mean pressure barometer at 32° Fahr.	TEMPERATURE.				HYGROMETRY.				WIND.		Rain.	WEATHER.
				Mean.	Maximum.	Range.	Minimum.	Mean wet bulb.	Vapour tension.	Dew point.	Humidity.	Prevailing direction.	Miles recorded.		
1881.		⊖	Inches.	⊖	⊖	⊖	⊖	⊖	Inches	⊖	%			Inches	
Nov.	6th	146·8	29·947	73·3	83·5	19·3	64·2	66·4	0·559	62·1	70	Calm and N by W ...	34	Nil	Cloudy, ⌓, o.
"	7th	139·7	·894	74·7	82·6	17·1	65·5	68·3	·611	64·6	71	Calm and N ...	57	"	Cloudy, ⌓.
"	8th	137·7	·887	74·6	82·9	16·3	66·6	68·4	·615	64·8	72	N ...	84	"	Cloudy, o, g.
"	9th	138·1	·894	73·0	81·3	15·8	65·5	67·0	·585	63·4	72	N and calm ...	52	"	Chiefly clear, ≡, ⌓,
"	10th	140·6	·888	74·0	83·6	18·1	65·5	68·5	·627	65·4	76	Calm, N and variable ...	53	"	Chiefly clear, ≡, ⌓.
"	11th	138·1	·905	73·[illegible]	83·3	18·9	64·4	67·7	·608	64·5	76	E by N, NNE and calm ...	70	"	Chiefly clear, ≡, ⌓.
"	12th	129·1	·927	72·1	82·7	18·4	64·3	66·2	·565	62·4	71	Calm and NNE ...	56	"	Cloudy, ⌓.

	Inches.
The mean pressure of the seven days	29·906
The average pressure of the corresponding period for 24 years, S. G. Office ...	29·939
	⊖
The mean temperature of the seven days	73·6
The average temperature of the corresponding period for 24 years, S. G. Office ...	76·7
The extreme variation of temperature during the seven days	19·4
The maximum temperature during the seven days	83·6
	Miles.
The highest velocity of the wind in one hour during the seven days	11
	lb.
The highest pressure of the wind on one square foot during the seven days ...	Not measureable.
	%
The mean relative humidity during the seven days	73
The average relative humidity of the corresponding period for 24 years, S. G. Office ...	73
	Inches.
The total fall of rain from 6th to 12th November 1881	Nil
The average fall of the corresponding period for 24 years, S. G. Office	0·37
The total fall from 1st January to 12th November 1881	69·22
The average fall of the corresponding period for 24 years, S. G. Office	65·10

The mean pressure, temperature, &c., are deduced from the traces of the barograph and thermograph, and from observations made at 6h, 10h, 16h, and 22h.

The maximum and minimum temperatures are obtained from self-registering thermometers. All the thermometers are verified, and the readings have been corrected to a standard constructed and verified at the Kew Observatory. They are exposed under a thatched shed open at the sides, and are suspended four feet above the ground.

The barometer readings are corrected approximately to those of the standard Newman's No. 86, formerly at the Surveyor-General's Office.

The hygrometric elements are obtained from Tables III, IV, and V of the official tables computed in the Meteorological Office, and based on Regnault's modifications of August's formula.

The direction of the movement of the wind are taken from the trace of a Beckley's anemograph.

The mouth of the rain-gauge is one foot above the ground.

⌓ dew, *o* overcast, *g* gloomy, ≡ fog.

H. F. BLANFORD,
Meteorological Reporter to the Government of India.

METEOROLOGICAL OFFICE, INDIA,
The 14th November 1881.

Results of the Thermometrical Observations taken at the Meteorological Office, Chowringhee, from 6th to 12th November 1881.

MONTH.	Date.	TEMPERATURE.				HYGROMETRY.			Rain.
		Mean.	Maximum.	Range.	Minimum.	Vapour tension.	Dew point.	Humidity.	
1881.		o	o	o	o	Inches.	o	%	Inches.
November	6th ...	74·3	85·3	19·3	66·0	0·544	61·4	64	Nil.
„	7th ...	74·4	83·8	17·5	66·3	·597	64·0	69	
„	8th ...	74·4	84·8	17·5	67·3	·627	65·4	72	
„	9th ...	73·5	83·6	17·8	65·8	·584	63·4	69	
„	10th ...	75·3	83·8	16·8	67·0	·631	65·6	72	
„	11th ...	74·7	84·8	19·0	65·8	·595	63·9	69	
„	12th ...	74·4	83·3	17·5	65·8	·557	62·0	72	

	o
The mean temperature of the seven days	74·4
The extreme variation of temperature during the seven days	19·5
The maximum temperature during the seven days	85·3
	%
The mean relative humidity during the seven days	70
The total fall of rain from 6th to 12th November 1881	Nil.

The mean temperature is obtained by applying to the mean of the 10h, 16h, and minimum readings a correction dependent on the range, and derived from the hourly observations at the Surveyor-General's Office, Chowringhee, in past years.

The means of the hygrometric elements are the crude means of the values derived from the three readings of the instruments.

METEOROLOGICAL OFFICE, INDIA,
The 14th November 1881.

H. F. BLANFORD,
Meteorological Reporter to the Govt. of India.

PUBLIC WORKS DEPARTMENT, BENGAL.

IRRIGATION BRANCH.

IRRIGATION OPERATIONS FOR 1881-82.

Areas leased for Irrigation up to end of September 1881.

CIRCLE.	DISTRICT.	CANAL.	SUPPLY OF WATER IN THE CANALS.			KHURREEF.								RUBBEE.					SUGARCANE.		GRAND TOTAL.					RAINFALL.			REMARKS.
						FIVE-YEAR LEASES.			THREE-YEAR LEASES.			ANNUAL LEASES.		THREE-YEAR LEASES.			ANNUAL LEASES.												
			Estimated full discharge in cubic feet per second.	Average discharge in cubic feet per second throughout the month.	Estimated discharge utilized.	Leased in September 1881.	Leased up to end of September 1881.	Total, inclusive of unexpired leases of previous years.	Leased in September 1881.	Leased up to end of September 1881.	Total, inclusive of unexpired leases of previous years.	Leased in September 1881.	Leased up to end of September 1881.	Leased in September 1881.	Leased up to end of September 1881.	Total, inclusive of unexpired leases of previous years.	Leased in September 1881.	Leased up to end of September 1881.	Leased in September 1881.	Leased up to end of September 1881.	Khurreef.	Rubbee.	Sugarcane.	Total.	Grand total of the corresponding month of last year.	Inches during the month.	Inches during 1881-82.	Average of the ten previous years of the same period.	
			C. ft.	C. ft.	C. ft.	Acr.	Acr.	Acr.	Acr	Acr.	Acr.	Acr.	Acr.	Acr.	Acr.	Acr.	Acr.	Acr.	Acr.	Acr.	Acr.	Acr.	Acr.	Acr.	Acr.	In.	In.	In.	
Orissa ...	Cuttack ...	Kendrapara ...	1,269	736·30	...	...	...	40,081	5,124	5,348	11,220	...	...	...	...	...	...	3,940	...	93	51,301	3,940	93	55,334	46,506	15·20	57·71	9·63	
		Pattamoondee	1,042	143·20	...	...	...	11,356	519	520	684	...	...	...	...	...	...	525	...	...	12,040	525	...	12,565	12,458				
		High Level, Section I ...	675	350·51	...	...	...	13,587	...	30	350	...	...	...	...	...	...	83	...	2	13,937	83	2	14,022	13,954				
		Taldanda ...	1,300	553·00	...	...	...	10,076	...	2	278	...	...	...	...	...	...	327	...	38	10,354	327	38	10,719	10,697				
		Matchgong ...	650	353·00	...	...	...	25,269	...	209	3,069	...	...	...	...	...	...	474	...	78	28,338	474	78	28,890	28,458				
	Balasore ...	High Level, Section II.	727·16	0·00	...	...	...	204	...	...	1,171	...	...	...	...	...	...	2	21	56	1,375	2	56	1,433	1,353				
	Total of the month ...		......	...	...	...	...	100,573	5,643	6,109	16,772	...	...	...	...	...	...	(a)5,351	21	(b)267	1,17,345	5,351	267	1,22,963	1,13,426	......	...	...	(a) Exclusive of 11 acres leased prior to 1st April last.
	Total of the corresponding month of previous year ...		......	...	...	...	264	101,463	717	6,810	6,921	...	...	...	...	...	15	4,871	...	171	1,08,884	4,871	171	1,13,426	......	......	...	...	(b) Exclusive of 1 acre under Machgong canal leased prior to 1st April last.
South-Western	Midnapore ...	Midnapore ...	875	611	...	...	(-) 1,194	90,420	...	(-) 1	75	...	...	...	...	...	...	...	...	...	90,495	...	...	......	88,554	5·62	63·88	46·32	
	Howrah ...	Panchkoorah ...	300	26	...	...	1,431	13,337	...	(-) 193	30	...	...	...	...	...	...	...	...	...	13,367	...	...	......	11,111	3·86	71·61	46·07	
	Total of the month ...		......	...	...	...	237	103,757	...	(-) 194	105	...	...	...	...	...	...	...	...	...	1,03,862	...	...	1,03,862	99,665	......	...	...	
	Total of the corresponding month of previous year ...		......	...	...	51	806	99,366	...	240	299	...	...	...	...	...	...	...	...	...	99,665	...	...	99,665	......	......	...	...	
Sone ...	Shahabad ...	Western Main	4,342	898	898	...	165	291	...	...	...	59	3,427	...	...	...	...	...	...	1,215	3,718	...	1,215	4,933	4,340	2·29	35·69	43·10	
		Buxar				...	2,094	2,094	...	...	...	340	9,858	...	...	...	...	...	...	4,059	11,952	...	4,059	16,011	15,698				
		Arrah	1,660	454	454	1,958	18,991	24,017	...	...	6,986	401	(c)13,439	...	...	...	...	...	...	7,522	44,442	...	7,522	51,964	42,118	3·82	42·42	36·25	
	Patna and Gya ...	Eastern Main...	1,466	387	387	...	...	...	...	...	...	10	151	...	...	...	...	...	...	15	151	...	15	166	573	6·13	36·52	35·58	(c) Exclusive of 631 acres changed into five year leases in the Nasrigunge Sub-Division.
		Patna				110	2,346	2,346	...	...	...	363	6,457	...	...	...	...	...	2	1,028	8,803	...	1,028	9,831	11,531				
	Total of the month ...		......	...	...	2,068	23,596	28,748	...	...	6,986	1,173	33,332	...	...	...	...	...	2	13,839	69,066	...	13,839	82,905	74,260	......	...	...	
	Total of the corresponding month of previous year ...		......	...	...	...	...	...	...	(-) 2,140	9,280	15,375	47,989	560	560	4,352	...	...	172	12,639	57,269	4,352	12,639	74,260	......	......	...	...	
	Grand Total of the month ...		......	...	...	2,068	23,833	233,078	5,643	5,915	23,863	1,173	33,332	...	...	...	...	5,351	23	14,106	2,90,273	5,351	14,106	3,09,730	2,87,351	......	...	...	
	Grand Total of the corresponding month of previous year ...		......	...	...	51	1,070	200,829	717	4,919	16,500	15,375	47,989	560	560	4,352	15	4,871	172	12,810	2,65,318	9,223	12,810	2,87,351	......	......	...	...	

Dated the 11*th November* 1881.

G. F. E. S. NEILL, *Major*, M.S.C.,
Asst. Secy. to the Govt. of Bengal,
in the P. W. Dept.

PUBLIC WORKS DEPARTMENT,—BENGAL.

IRRIGATION BRANCH.

Statement showing heights over mean sea-level and low-water on Rivers Ganges, Bhagiruthee, and Brahmapootra for the month of September 1881.

Date.	Distance. Miles.	RIVER GANGES.																RIVER BHAGIRUTHEE.				BRAHMAPOOTRA.	
		Mirzapore.		Benares.		Buxar.		Dinapore.		Monghyr.		Sahebgunge.		Rampore Beauleah.		Goalundo.		Berhampore.		Kishnaghur.		Gowhatty.	
	Miles.						90.	177.	87.	287.	110.	381.	94.	471.	90.	591.	120.				70		
	Distance.						From Benares	From Benares	From Buxar	From Benares	From Dinapore	From Benares	From Monghyr	From Benares	From Saheb-gunge ...	From Benares	From Rampore Beauleah ...				From Berham-pore ...		
		Height over zero of gauge.	Height over mean sea-level.	Height over zero of gauge.	Height over mean sea-level.	Height over zero of gauge.	Height over mean sea-level.	Height over zero of gauge.	Height over mean sea-level.	Height over zero of gauge.	Height over mean sea-level.	Height over zero of gauge.	Height over mean sea-level.	Height over zero of gauge.	Height over mean sea-level.	Height over zero of gauge.	Height over mean sea-level.	Height over zero of gauge.	Height over mean sea-level.	Height over zero of gauge.	Height over mean sea-level.	Height over zero of gauge.	Height over mean sea-level.
1st ...	...	28·33	234·55	28·58	225·38	25·00	194·05	30·30	164·53	23·75	125·60	26·67	94·67	24·39	66·39	18·42	27·36	27·75	61·49	24·92	33·71	19·90	168·66
2nd ...	...	26·83	233·05	27·33	224·13	24·92	193·97	30·45	164·68	23·50	125·35	26·58	94·58	24·33	66·33	18·42	27·36	27·81	61·55	24·92	33·71	20·80	169·56
3rd ...	...	25·17	231·39	25·58	222·38	24·00	193·05	30·05	164·28	23·92	125·77	26·33	94·33	24·29	66·29	18·33	27·27	27·79	61·53	25·00	33·79	22·20	170·96
4th ...	...	24·25	230·47	24·33	221·13	22·92	191·97	29·30	163·53	23·25	125·10	26·00	94·00	24·33	66·33	18·33	27·27	27·73	61·47	25·04	33·83	23·40	172·16
5th ...	...	22·83	229·05	23·25	220·05	22·00	191·05	28·75	162·98	22·75	124·60	26·00	94·00	24·29	66·29	18·75	27·69	27·67	61·41	25·08	33·87	24·70	173·46
6th ...	...	22·00	228·22	22·17	218·97	20·92	189·97	28·65	162·88	22·33	124·18	25·83	93·83	24·12	66·12	19·17	28·11	27·60	61·34	25·12	33·91	25·80	174·56
7th ...	...	21·00	227·22	22·08	218·88	20·42	189·47	28·75	162·98	22·25	124·10	25·58	93·58	24·00	66·00	19·50	28·44	27·42	61·16	25·12	33·91	26·70	175·46
8th ...	...	21·00	227·22	22·17	218·97	20·25	189·30	28·70	162·93	22·33	124·18	25·00	93·00	23·92	65·92	19·67	28·61	27·17	60·91	25·12	33·91	27·50	176·26
9th ...	...	19·08	225·30	22·00	218·80	20·25	189·30	28·55	162·78	22·08	123·93	25·00	93·00	23·75	65·75	19·92	28·86	26·92	60·66	25·12	33·91	27·80	176·56
10th ...	...	16·42	222·64	21·08	217·88	20·00	189·05	28·25	162·48	21·75	123·60	24·92	92·92	23·50	65·50	20·17	29·11	26·67	60·41	25·08	33·87	27·60	176·36
11th ...	...	14·92	221·14	19·92	216·72	19·25	188·30	27·60	161·83	21·33	123·18	24·67	92·67	23·42	65·42	20·00	28·94	26·46	60·20	25·00	33·79	27·30	176·06
12th ...	...	13·67	219·89	18·75	215·55	18·25	187·30	26·70	160·93	20·58	122·43	24·00	92·00	23·17	65·17	20·00	28·94	26·12	59·86	24·92	33·71	26·90	175·66
13th ...	...	12·67	218·89	17·75	214·55	17·25	186·30	26·25	160·48	19·50	121·35	23·42	91·42	22·83	64·83	20·25	29·19	25·83	59·57	24·83	33·62	26·40	175·16
14th ...	...	11·92	218·14	17·00	213·80	16·33	185·38	25·65	159·88	19·00	120·85	22·58	90·58	22·42	64·42	20·00	28·94	25·46	59·20	24·83	33·62	26·00	174·76
15th ...	...	11·00	217·22	16·17	212·97	15·50	184·55	24·95	159·18	17·25	119·10	21·67	89·67	21·92	63·92	19·50	28·44	24·87	58·61	24·75	33·54	25·70	174·46
16th ...	...	10·25	216·47	15·92	212·72	14·83	183·88	24·50	158·73	17·00	118·85	21·00	89·00	21·54	63·54	19·25	28·19	24·29	58·03	24·54	33·33	25·30	174·06
17th ...	...	9·58	215·80	15·08	211·88	14·08	183·13	24·00	158·23	16·67	118·52	20·67	88·67	21·00	63·00	19·08	28·02	23·75	57·49	24·29	33·08	25·20	173·96
18th ...	...	9·00	215·22	14·58	211·38	13·67	182·72	24·15	158·38	16·42	118·27	20·33	88·33	20·58	62·58	19·00	27·94	23·12	56·86	24·00	32·79	25·40	174·16
19th ...	...	8·83	215·05	14·00	210·80	13·25	182·30	23·80	158·03	17·00	118·85	20·25	88·25	20·25	62·25	19·00	27·94	22·58	56·32	23·75	32·54	25·60	174·36
20th ...	...	8·67	214·89	12·83	209·63	12·83	181·88	23·65	157·88	17·83	119·68	20·00	88·00	20·33	62·33	19·17	28·11	22·46	56·20	23·50	32·29	25·90	174·66
21st ...	...	10·17	216·39	14·33	211·13	11·92	180·97	23·55	157·78	17·75	119·60	19·83	87·83	20·42	62·42	18·92	27·86	22·39	56·13	23·29	32·08	26·70	175·46
22nd ...	...	13·17	219·39	16·08	212·88	12·25	181·30	23·70	157·93	17·25	119·10	20·00	88·00	20·42	62·42	19·33	28·27	22·37	56·11	23·08	31·87	27·20	175·96
23rd ...	...	15·17	221·39	16·50	213·30	14·50	183·55	24·30	158·53	16·75	118·60	20·50	88·50	20·39	62·39	19·50	28·44	22·29	56·03	22·92	31·71	27·50	176·26
24th ...	...	16·67	222·89	16·83	213·63	15·17	184·22	24·50	158·73	16·75	118·60	20·25	88·25	20·37	62·37	19·75	28·69	22·17	55·91	22·92	31·71	27·70	176·46
25th ...	...	17·83	224·05	16·42	213·22	15·42	184·47	24·35	158·53	16·75	118·60	20·25	88·25	20·33	62·33	19·75	28·69	21·93	55·70	22·75	31·54	28·20	176·96
26th ...	...	16·67	222·89	15·00	211·80	15·33	184·38	24·00	158·23	16·67	118·52	20·17	88·17	20·42	62·42	19·67	28·61	21·93	55·72	22·50	31·29	28·60	177·36
27th ...	...	16·00	222·22	14·00	210·80	14·83	183·88	23·50	157·73	16·08	117·93	20·00	88·00	20·50	62·50	19·67	28·61	22·12	55·86	22·33	31·12	28·70	177·46
28th ...	...	14·83	221·05	11·00	207·80	14·25	183·30	23·30	157·43	15·67	117·52	19·83	87·83	20·37	62·37	19·83	28·77	22·04	55·78	22·25	31·04	28·50	177·26
29th ...	...	13·92	220·14	11·00	207·80	13·42	182·47	23·00	157·23	15·50	117·35	19·58	87·58	20·17	62·17	20·00	28·94	21·87	55·61	22·17	30·96	28·30	177·06
30th ...	...	12·25	218·47	10·58	207·38	12·67	181·72	22·90	157·13	15·50	117·35	19·00	87·00	19·96	61·96	20·17	29·11	21·62	55·36	21·92	30·71	28·10	176·86

G. F. E. S. Neill, *Major*, M.S.C.,
Asst. Secy. to the Govt. of Bengal, P. W. Dept.

Calcutta, dated the 11th November 1881.

Report on Traffic of the East Indian Railway during the four weeks ending 24th September 1881.

THE approximate figures for the period are as follow :—

Period.	Coaching.		Goods.		Total.	Materials carried on Revenue account, including maintenance.	
	No.	Rs.	Mds.	Rs.	Rs.	Mds.	Rs.
1881	642,823	8,60,227	70,79,158	27,63,071	36,23,298	11,19,250	68,440
1880	605,861	8,13,318	49,75,452	17,11,148	25,24,466	17,83,928	57,153
Increase	36,962	46,909	21,03,706	10,51,923	10,98,832	......	11,287
Decrease	......	......	......	......	......	6,64,678	......

resulting in an increase of 43 per cent. on the whole traffic.

The most striking feature in the goods traffic is the very large increase in the weight of, and earnings derived from, the carriage of *wheat.*

The traffic was normal in other staples, the principal fluctuations being—

INCREASES.

Coal, upwards.	Gunny.	Salt.
Ghee and oil.	Iron.	Seeds.

DECREASES.

Coal, downwards.	Ordnance stores.	Rice and other grains.
Cotton.	Barley.	Piece-goods.

INCREASES.

Coal, up ... ... Mds. 2,10,150 Rs. 1,11,330

The traffic in upwards coal in September last year had fallen off considerably owing to the completion of contracts by the several Coal Companies.

Ghee and oil ... ... Mds. 12,630 Rs. 12,710

A small portion of this increase is derived from kerosine oil despatched from Howrah to stations up-country. The largest portion, however, is in ghee from stations in the North-West to Calcutta, Bombay, and stations in Central India.

Gunny ... ... Mds. 8,800 Rs. 9,320

The demand for bags for transport of grain has led to this increase.

Iron ... ... Mds. 13,710 Rs. 15,620

Consisted chiefly of iron carried at second-class rate, *i. e.* machinery, girders, &c., from Howrah to Cawnpore for the Cotton Mills.

Salt ... ... Mds. 1,00,770 Rs. 30,720

There is a general increase apparent in salt at all points.

Seeds ... ... Mds 99,920 Rs. 50,750

Better demand.

DECREASES.

Coal, downwards ... ... Mds. 56,080 Rs. 6,060

This is comparatively a nominal decrease, and may be attributed to the heavy and incessant rainfall, causing stoppage of work at some of the collieries.

Cotton ... ... Mds. 10,110 Rs. 14,270

The depression noticed in my several monthly reports of late continued during September.

Ordnance stores ... ... Mds. 2,370 Rs. 10,050

Limited despatches from Howrah to the several depôts in the North-West and Punjab.

Barley	Mds.	34,550	Rs.	8,050
Rice	„	85,010	„	9,040
Other grain	„	2,700	„	10,710
Piece-goods	„	3,980	„	14,260

Both the Bombay and Calcutta market reports teem with remarks on the continued dulness of the import trade.

The Train mileage for the period has been, excluding maintenance and locomotive coal—

Train mileage.

	Coaching.	Goods.	Total.
1881	191,714	513,749	705,463
1880	191,709	321,362	513,071
Increases	5	192,387	192,392
Decreases	......	......	......

Earnings per train-mile, excluding materials carried on Maintenance and Revenue account—

	Coaching.			Goods.			Total.		
	Rs.	A.	P.	Rs.	A.	P.	Rs.	A.	P.
1881	4	7	9	5	6	1	5	2	2
1880	4	3	11	5	5	2	4	14	9
Increases	0	3	10	0	0	11	0	3	5
Decreases	......			......			......		

Shunting mileage, increase—hours 3,061.

The following are details :—

Stations.	No. of hours.	Particulars.
Howrah	400	Heavy traffic.
Barakar	110	Heavy coal traffic.
Giridi	37	
Maghalsarai	458	Location of special pilot engine.
Dinapore	566	Ditto ditto.
Patna	28	Heavy traffic.
Barh	18	Ditto.
Allahabad	175	Ditto.
Cawnpore	689	Ditto.
Aligarh	184	Ditto.
Agra	134	Ditto, and making up trains for Agra Cantonment.
Delhi	231	Joint working and increase of traffic consequent on the reduction of grain rates.
Total ...	3,030	

EAST INDIAN RAILWAY.

Statement showing the Totals and Increases and Decreases of Staples during four weeks ending 24th September 1881.

STAPLES.		WEIGHT.		AMOUNT.		1881.			
		1880.	1881.	1880.	1881.	Increase.		Decrease.	
		Mds.	Mds.	Rs.	Rs.	Mds.	Rs.	Mds.	Rs.
Beer, Commissariat		390	3,620	130	5,600	3,230	5,470	......	......
" not Commissariat		2,810	2,510	4,190	3,760	......	......	300	730
Betel-nuts and leaves		7,730	7,870	7,780	7,860	140	80	......	......
Boots and shoes		2,320	2,800	3,430	4,120	480	690	......	......
Brass and brassware		16,160	16,830	14,360	14,800	670	440	......	......
Bricks		4,720	4,540	1,480	1,470	......	......	180	10
Coal, up		3,17,400	5,27,550	1,54,740	2,66,070	2,10,150	1,11,330	......	......
" down		13,85,950	13,29,870	1,90,600	1,84,540	......	......	56,080	6,060
Copper		9,600	11,200	13,940	16,930	1,600	2,990	......	......
Cotton		30,470	20,360	39,550	25,280	......	......	10,110	14,270
" twist		12,100	12,710	16,350	16,580	610	230	......	......
Dyewood		2,760	3,880	2,100	3,270	1,120	1,170	......	......
Empty coopahs, &c.		5,070	5,450	3,230	3,430	380	200	......	......
Firewood		10,010	8,490	530	720	......	190	1,520	......
Fruits		12,000	12,800	7,470	8,560	800	1,090	......	......
Glassware		6,170	4,370	8,470	6,430	......	......	1,800	2,040
Ghee and oil		26,640	39,270	29,530	42,240	12,630	12,710	......	......
G. B. T. packages		3,330	3,300	4,840	4,810	......	......	30	30
Government Commissariat stores		7,610	7,410	10,140	11,510	......	1,370	200	......
" Ordnance stores		13,820	11,450	31,570	21,520	......	......	2,370	10,050
GRAINS, EDIBLE, & PULSES.	Barley	62,320	27,770	14,520	6,470	......	......	34,550	8,050
	Oats	3,240	3,380	1,240	1,280	140	40	......	......
	Rice	3,16,370	2,31,360	74,780	65,740	......	......	85,010	9,040
	Wheat	3,36,890	19,94,570	68,670	9,32,950	16,57,680	8,64,280	......	......
	Other grains	2,84,630	2,81,930	74,670	63,960	......	......	2,700	10,710
	Pulses of all kinds	2,12,920	2,25,010	61,670	70,770	12,090	9,100	......	......
Gunny		52,710	61,510	37,450	46,770	8,800	9,320	......	......
Hides and horns		38,600	34,830	29,300	27,360	......	......	3,770	1,940
Indigo		3,350	2,260	790	640	......	......	1,090	150
Iron		59,760	73,470	54,890	70,510	13,710	15,620	......	......
Jaggree		21,480	33,490	6,580	8,250	12,010	1,670	......	......
Lac		19,590	24,910	12,360	15,950	5,320	3,590	......	......
Minerals		45,110	57,000	4,230	5,460	11,890	1,230	......	......
Mowah flower		15,230	13,350	2,700	2,080	......	......	1,880	620
Oil-cake		12,440	9,320	2,420	2,400	......	......	3,120	20
Opium		1,080	970	1,640	1,550	......	......	110	90
Paper		6,110	5,910	8,580	7,980	......	......	200	600
Piece-goods		1,28,830	1,24,850	1,63,460	1,49,200	......	......	3,980	14,260
Railway materials, construction account		30,600	37,510	2,470	2,970	6,910	500	......	......
" " foreign		68,260	40,890	66,370	45,810	......	......	27,370	20,560
Roots		12,010	18,220	4,940	6,330	6,210	1,390	......	......
Salt		2,85,360	3,86,130	81,680	1,12,400	1,00,770	30,720	......	......
Saltpetre		30,930	26,320	14,900	11,790	......	......	4,610	3,110
Seeds		5,69,540	6,69,460	1,82,260	2,33,010	99,920	50,750	......	......
Silk		2,990	2,390	4,210	2,790	......	......	600	1,420
Spelter		12,880	8,410	19,260	12,630	......	......	4,470	6.630
Spices		8,940	7,650	6,570	6,330	......	......	1,290	240
Stones		63,730	68,230	9,010	8,710	4,500	......	......	300
Sugar		93,810	79,250	42,190	33,580	......	......	14,560	8,610
Tea		2,250	2,740	2,080	3,700	490	1,620	......	......
Timber		14,850	14,630	7,060	6,130	......	......	220	930
Tobacco		15,120	20,600	6,250	9,160	5,480	2,910	......	......
Turmeric		3,530	3,290	1,870	1,450	......	......	240	420
Wines		3,610	3,500	7,320	6,920	......	......	110	400
Miscellaneous		1,06,330	1,12,580	1,03,640	1,02,930	6,250	......	......	710
Total		48,22,460	67,43,970	17,26,460	27,35,460	21,83,980	11,30,700	2,62,470	1,21,700

N. ST. L. CARTER, *Traffic Manager.*

Weekly Return of Traffic Receipts on Indian Railways.

EAST INDIAN RAILWAY.

Approximate Return of Traffic for week ended 5th November 1881 *on* 1,504¼ *miles open.*

	COACHING TRAFFIC.		MERCHANDISE AND MINERAL TRAFFIC.		Other earnings (estimated).	Total earnings.	TRAFFIC TRAIN-MILES RUN.		
	Number of passengers.	Coaching receipts.	Weight carried.	Receipts.			Coaching.	Merchandise.	Total.
		Rs. A. P.	Mds. S.	Rs. A. P.	Rs. A. P.	Rs. A. P.			
Total traffic for the week	171,618	2,75,251 6 6	18,98,665 30	6,14,036 3 3	13,689 10 0	9,02,977 3 9	52,501¾	108,068¾	160,57
Or per mile of railway	......	182 15 9	......	408 3 3	9 1 7	600 4 7	......	......	......
For previous 17 weeks of half-year	2,655,915	34,93,743 11 9	3,13,82,134 10	98,15,894 4 7	2,06,435 14 6	1,35,16,073 14 10	835,844½	1,929,934	2,765,77
Total for 18 weeks	2,827,533	37,68,995 2 3	3,32,80,800 0	1,04,29,930 7 10	2,20,125 8 6	1,44,19,051 2 7	888,346¼	2,038,002¾	2,926,34
COMPARISON.									
Total for corresponding week of previous year	141,185½	2,25,344 10 6	11,72,156 0	5,16,501 14 9	12,052 15 9	7,53,899 9 0	49,051	97,226	146,27
Per mile of railway corresponding week of previous year	......	149 8 2	......	342 10 10	7 15 11	500 2 11	......	......	......
Total to corresponding date of previous year	2,674,703½	37,14,782 14 7	2,69,99,746 30	81,61,313 6 3	2,90,266 12 5	1,21,66,363 1 3	899,045	1,547,092	2,446,13

EASTERN BENGAL RAILWAY.

Approximate Return of Traffic for week ended 5th November 1881 *on* 171¾ *miles open.*

	COACHING TRAFFIC.		MERCHANDISE AND MINERAL TRAFFIC.		Other earnings (estimated).	Total earnings*	TOTAL TRAIN-MILES RUN.		
	Number of passengers.	Coaching receipts.	Weight carried.	Receipts.			Coaching.	Merchandise.	Total.
		Rs. A. P.	Mds. s.	Rs. A. P.	Rs. A. P.	Rs. A. P.			
Total traffic for the week ...	51,469	34,850 0 0	2,95,904 0	77,790 0 0	680 0 0	1,13,320 0 0	5,779¾	9,175½	14,955½
Or per mile of railway	300	202 14 7	1,722 35	452 14 10	3 15 4	659 12 9	......	......	.....
For previous 18 weeks of half-year	717,896½	4,72,251 0 0	56,67,009 0	19,06,401 0 0	9,007 0 0	23,87,659 0 0	100,197¾	196,423¾	296,621½
Total for 19 weeks ...	769,365½	5,07,101 0 0	39,62,913 0	19,84,191 0 0	9,687 0 0	25,00,979 0 0	105,977½	205,599¼	311,576¾
COMPARISON.									
Total for corresponding week of previous year	34,729½	26,319 0 0	2,66,286 0	67,122 0 0	2,727 0 0	96,168 0 0	5,689½	8,532¼	14,222¼
Per mile of railway corresponding week of previous year ...	202	153 3 10	1,550 17	390 13 0	15 14 1	559 14 11	......	......	......
Total to corresponding date of previous year	689,870½	4,46,288 0 0	49,55,439 0	15,66,080 0 0	10,384 0 0	20,22,752 0 0	105,774¾	173,800	279,574½

* Rs. 214 included on account of carriage of Revenue stores.

BENGAL PROVINCIAL RAILWAYS.

Weekly Statement of Traffic Receipts.

No. 38.

Latest return received.	Name of Railway.	Length open.	RECEIPTS FOR WEEK ENDING		TOTAL RECEIPTS FROM 1ST JANUARY		Total increase in 1881.	Total decrease in 1881.	Percentage of increase or decrease.
			2nd October 1880.	1st October 1881.	To 2nd October 1880.	To 1st October 1881.			
1881.		Miles.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs.	
8th October ...	Northern Bengal ...	230	39,926 0 0	47,975 0 0	11,25,968 0 0	12,45,107 0 0	1,19,139 0 0	......	+10
8th ditto ...	Tirhoot	82	9,887 0 0	11,355 0 0	4,01,954 0 0	4,27,305 0 0	25,351 0 0	......	+6
15th ditto ..	Patna-Gya	57	17,252 0 0	10,360 0 0	3,48,041 0 0	3,82,264 0 0	34,223 0 0	......	+9
22nd ditto ...	Calcutta and South-Eastern	28	1,796 0 0	2,218 0 0	1,07,181 0 0	1,16,035 0 0	8,854 0 0	......	+8
8th ditto ...	Nalhati	27¼	1,206 0 0	1,627 0 0	55,200 0 0	50,048 0 0	......	5,152	−9
	Total ...	424¼	70,067 0 0	73,535 0 0	20,38,344 0 0	22,20,759 0 0	1,82,415 0 0	......	+8

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EQUALIZING PRESSURE ON FOUNDATIONS.

Note by MR. J. H. APJOHN, *Executive Engineer, Circular and Eastern Canals Division, on the subject of equalizing pressure on foundations.*

ALL locks hitherto built on the tidal rivers of Lower Bengal have cracked more or less, it is therefore proposed to examine in the following note the causes of these cracks and the possibility of building a lock in such a way as to prevent them from occurring.

2. The soil in every case on which they have been founded is the well-known bluish black slimy clay with trunks of trees distributed through it, and in some cases vegetable remains, bearing a strong resemblance to peat such as is found in an Irish bog. This soil, as far as the writer is aware, is found within tidal range throughout the Gangetic Delta, and beginning about 10 feet below the surface soil goes to an unknown depth; the only instance in which it seems to have been got through is at Dhappa, where at a depth of 29 feet below mean sea, and 39 feet from the natural surface of the ground, a stiffer stratum was reached by the foundation wells of the lock, which stratum was described as very stiff clay with nodular limestone scattered through it.

3. The black soil in question is of a very treacherous nature, hard and stiff when dry, and in that state cracking much through contraction, and on the other hand, slimy and subject to slips and upheavals when a pit is sunk in it in its natural moist state. All buildings founded on it without the precaution being taken to have equipressure all over the bearing surface of the foundations have cracked badly, evidently the result of unequal settlement.

4. In order to arrive at some definite knowledge as to the safe weight to allow on foundations in the alluvial soil of Bengal, a series of experiments on a large scale was carried out in 1873 at the Acra Government Brick-field, and a note on them was published by Mr. Leonard, Chief Engineer, on the 17th May 1873. An analysis of the records of these experiments now made by the writer has resulted in the detection of an apparent law of settlement, viz. that, as the pressure increases in an arithmetical series, the settlement increases in a geometrical.

5. The experiments were conducted by building brick-work piers founded at four different depths, viz. 2½, 4, 8, and 11 feet from the surface. These piers were 3′-2½″ square, thus giving a bearing surface of 10·24 square feet. They were then loaded, so as to produce a pressure per square foot of bearing surface varying from 1·5 to 3·7 tons, the sinkage produced by the weights being accurately observed. Each pillar was loaded with three different weights, increasing by a ton per square foot, and they were left with the weight bearing on them in each case until no further sinkage could be observed.

6. In Mr. Leonard's note the results of the experiments are not given in a form that conveys much information at first inspection, so the writer has put them into table No. 1. In it the pressures are shown (in the first column) increasing by tenths from 0 to 4 tons per square foot, and the sinkages observed are shown in inches and decimals in columns 2, 5, 8, and 11. It is at once seen that the sinkage increases more rapidly than the pressure. To try if the sinkage complies with the conditions of a geometric series, take the sinkage observed at (for the foundation 2½ feet deep) 1·2 tons per square foot pressure for the first term of a series of 21 terms and the sinkage observed at 3·2 tons for the last, the ratio will be found to be 1·17. With this ratio the whole series between 0 and 4 tons per square foot is calculated and it will be seen that the observed middle term agrees with the next term but one as calculated. In the same way if series be calculated for the sinkages observed at the depths 4, 8, and 11 feet, it will be found that the ratios are respectively 1·15, 1·12, and 1·10, and that in two of the series the calculated differs from the observed middle term by only one place and in the last by one and a half places. It may fairly be taken as proved that as above stated the sinkages increase geometrically as the pressure increases arithmetically.

7. It is not stated in Mr. Leonard's note what was the nature of the soil found at the various depths at which the pillars were built, so to determine this important point the writer has with the assistance of Mr. Nightingale, Executive Engineer, 1st Calcutta Division, searched for and found the experimental pillars at Acra and had a pit sunk in the midst of them with the result that all the pillars except that sunk to 11 feet, are discovered to be founded in light coloured loamy brick earth, but the latter pillar is built on the black soil, which is reached at a depth from the surface of a little under 11 feet.

8. From the table the curves shown in figure No. 1 have been plotted, showing the relation between the pressure and sinkage at the different depths; these curves are evidently hyperbolas. The middle sinkage as actually measured is plotted and referred to the corresponding place in the curve by reference letters. It will be seen that for the depths of 4 and 8 feet these points fall almost exactly on the curves, and that for 2½ and 11 feet they are not so far but that an almost similar curve to that plotted from the calculated sinkages could be drawn through the three points actually determined.

9. It will be noticed that the deeper the foundations the smaller the ratio of the series by which the sinkage increases, and these ratios themselves apparently conform to a law, viz. that as the depth of the foundations from the surface increases in arithmetical progression, the ratios of the series expressing the rate of sinkage at each depth decreases according to a geometrical series, the ratio of which is less than unity. It will be found on trial that a series of 18 terms of which the first term is 1·17 and the last is 1·10 will have a ratio of 0·99665 and that its 4th and 12th terms will be 1·15 and 1·12 as actually determined for the depths 4 feet and 8 feet from the surface, which are the 4th and 12th terms in an arithmetical series increasing by a common difference of 0·5 from 2·5 to 11·0.

10. The conclusions that the writer would draw from the above analysis of Mr. Leonard's experiments are as follows:—

1st.—The initial sinkage for a pressure of say one ton to the square foot will depend on the nature of the soil, being greater for the black subsoil than for the surface loam.

2nd.—The ratio of the series by which the sinkage increases diminishes with the depth, the curve expressing it tends to become flatter indefinitely as the depth increases but being a hyperbola never becomes absolutely a right line. The ratio of the series by which the ratios of sinkage at the various depths diminish is probably a function of the thickness of the alluvial crust, but at present there is not sufficient experimental data to determine it.

3rd.—The practical conclusion is that in every structure equipressure must be secured as nearly as possible in order to prevent irregular settlement and consequent cracks.

11. To determine the nature of the settlements that have caused the cracks in existing locks, the plans of a number of them (the histories of which are known) have been examined and the forces at work calculated. The great difficulty with a lock is to determine the amount and the direction of the earth pressure against the walls, such pressure being most uncertain in its action, depending on the nature of the soil, the state of weather and the way in which the filling has been done. For purposes of calculation the elegant graphic method of Professor Reilly of Cooper's Hill College has been used communicated by Mr. R. O. Clayton, Assistant Engineer,) the natural slope of the earth being taken at 2 to 1.

12. Of all those examined by the writer the lock that most clearly illustrates the cause of cracks is that at Gaowkhally on the Hidgellee Tidal Canal. This was the last lock built on that canal, and the other three having all cracked, extra precautions were adopted in its construction but without success. The plan and cross sections of the different parts of the lock are shown in figures 2, 3, 4, and 5, from which the method adopted in its construction is seen. All the other locks having apparently cracked from the walls falling back, the backing was done in a novel way calculated in the writer's opinion to directly defeat the object aimed at which was to secure a constant earth pressure against the walls. The earth backing was carried up in thin layers very carefully rammed and a wedge of sand inserted between it and the back of the wall. The lock was commenced in February and finished in the following June, before the rains set in, the foundations being the whole time perfectly free from water; nevertheless the cracks shown on the plan occurred early in June.

13. The figures and arrows on the cross sections show the calculated forces and their directions; in determining the centre of gravity of the walls the sand backing vertically above the footings is considered a part of the wall, the back of which is then assumed to be vertical and the following units of weight have been adopted, brick-work 112 lbs. per cubic foot, clay backing the same, and sand filling 90 lbs. It is seen that in every case, the centre of gravity falls behind the centre of figure of the bearing surface, viz. the point midway between the back of the footings and the centre of the lock and even the full earth pressure is not sufficient to throw the resultant of the two forces as far forward as this centre point, consequently the pressure on the subjacent earth is greater at the back of the wall than elsewhere. The pressures may be calculated as follows:—

Let x be centre of lock.
y be toe of footings.
P_x = pressure in tons per square foot at x.
P_y = ditto ditto at y.
V_o = distance between intersection of line of pressure with the plane of bearing surface and the centre point of same.
V = half width of bearing surface.
W = area of unit of length of bearing surface.
P = total weight of wall.

$$R^2 = \text{radius of gyration of bearing surface} = \frac{4\,V^2}{12}$$

$$P_x = \frac{P}{W}\left(1 - \frac{V_o V}{r^2}\right)$$

$$P_y = \frac{P}{W}\left(1 + \frac{V_o V}{r^2}\right)$$

14. In table No. 2 are shown the earth pressures calculated as above, both when the weight only is considered to be acting and also when the pressure from backing is taken into account. Then from the pressures so determined, corresponding sinkages are obtained from the former table (the series for foundations 11 feet deep been used), and from these sinkages the widths of the cracks to be expected are calculated and tabulated along with the widths that were actually measured.

15. Examination of the last three columns of the table will show that for the upper sill and chamber the actual width of cracks falls between those calculated as due to weight only and those caused by both weight and pressure of backing. This apparently shows that the pressure actually exercised by the backing was considerably less than that calculated, and this is exactly what might be expected from the way that the filling was done. In the case of the lower sill, the crack observed was that due to weight and full earth pressure, but the writer ascribes this to the walls being prevented falling back as much as they otherwise would have done by the support afforded by the wing-walls, which must have given great support prior to the vertical cracks close to their junctions with the lock having occurred. Another explanation that might be given is that there being no invert in this portion of the lock, the flat-floor does not transmit the pressure as far as the centre and in consequence the centre of the bearing surface is thrown further back, and so more nearly coincides with the resultant of the weight and earth pressure.

16. The width between the walls at coping level has lately been measured by Mr. Norman, Assistant Engineer, at the writer's request, and found to be one inch greater than built between the upper gate counterforts and one and a half between the lower; these measurements are about quarter of an inch greater than those due to the widths of the cracks observed, but such a small dimension as quarter of an inch may easily be explained by error in measurement of the width of the cracks, as in the lower sill one quarter inch increase of width at coping level means only one-twentieth of an inch in the crack through sill.

17. All the other locks examined seem to have cracked for the same reason, viz. the settling back of the walls; it is evident therefore that when designing a lock an endeavour should be made to obtain equipressure, but it is not possible to do this with certainty, as the thrust due to the earth backing is subject to variation, and cannot be accurately determined. It would be less injurious to have the resultant fall inside the centre of bearing surface, as then the platform of the lock would be compressed instead of being torn asunder, and it would be capable of resisting to a great extent any tendency of the walls to incline inwards.

18. When the revised design was made for Chitpore lock after it was determined to discard wells, the investigations into the cause of cracks in locks above described had not been made and viewed by the light now thrown on the subject, the necessity of alteration is apparent. Figure 6 shows a cross section through inner bay sill and bridge abutment. The first difficulty that occurs in calculating the earth pressures in a wide lock is to determine the true bearing surface, as the floor 8′-8″ thick cannot act as footings so far as to the centre line of the lock a distance of 20 feet. Rankine says that footings transmit pressure to a distance from the toe of the wall equal to their depth, and this seems to be most likely; unless the footings are very weak it certainly is not less, and it cannot well be more, or the pressure would be transmitted through the tenacity of the mortar joints, which is not probable. In calculating the pressure for Chitpore the bearing surface is therefore taken to extend from y at the back of the wall to x, a distance from the face equal to the thickness of the floor.

19. The total weight bearing on the surface from x to y, (figure 6) with a width of one foot neglecting the pressure of the backing, is 56 tons and the centre of gravity falls 3·5 feet behind the centre of figure, this would give the pressure at x and y as follows:—

$P_x = 0 \cdot 6$ tons per square foot.
$P_y = 1 \cdot 8$,, ,, ,,

If the earth pressure be taken into account, the vertical resultant of the weight and pressure will be 64 tons and will fall 2·75 feet behind the centre of figure and will therefore give—

$P_x = 0 \cdot 9$ tons per square foot.
$P_y = 1 \cdot 9$,, ,, ,,

which would have caused a falling back of the walls of probably one inch.

20. As it was not practically possible to alter the width of the base, the foundations up to sill level having been already laid, there remained no way of forcing the resultant of the weight of the wall, and the pressure of the earth backing to pass through the centre of the bearing surface except to carry up the wall vertically at the back, leaving arched voids in it for lightness. By this means as shown in figure 7, the resultant has been made to pass through the required point, and if the full pressure expected is given by the earth backing the pressure from x to y will be equal throughout, and at the rate of 1·2 tons to the square foot. If the full effect of the backing was not experienced and the resultant cut the base 2 feet behind the centre the pressures would be—

$P_x = 0 \cdot 9$ tons per square foot.
$P_y = 1 \cdot 5$,, ,, ,,

If the corresponding sinkages be taken from table No. 1 (last series) the subsidence at y would only be ·4″ in excess of that at x or only half as much as would occur under the most favourable circumstances as the lock was at first designed. It is very improbable that the earth pressure should fail to bring the resultant within two feet of the centre, especially as the earth will be tipped in behind the walls and let settle of its own accord while exposed to the weather, instead of being carefully rammed in layers which tends much to reduce the thrust. In consequence of the very wide base the settlement at y ·4″ in excess of that at x, would only produce a crack of one-eighth of an inch in width. However even if equipressure be obtained there will be a settlement of the lock walls according to the table of ·73,″ and although the walls remain plumb, it is probable that there will still be a longitudinal crack through the floor as it only weighing ·4 of a ton per square foot will sink ·32,″ but being pulled down an extra ·41″ on either side, it will probably have its back broken, but it is quite possible that it might bend to such a very small degree without any visible crack. It is believed by the writer that a longitudinal crack not exceeding one-eighth of an inch in width is the worst that is to be feared.

21. On the above principles the whole of the lock has been so designed as to have equipressure throughout, when the backing is exerting its full thrust, and in the event of its failing to do so the evil effects will be reduced to a minimum.

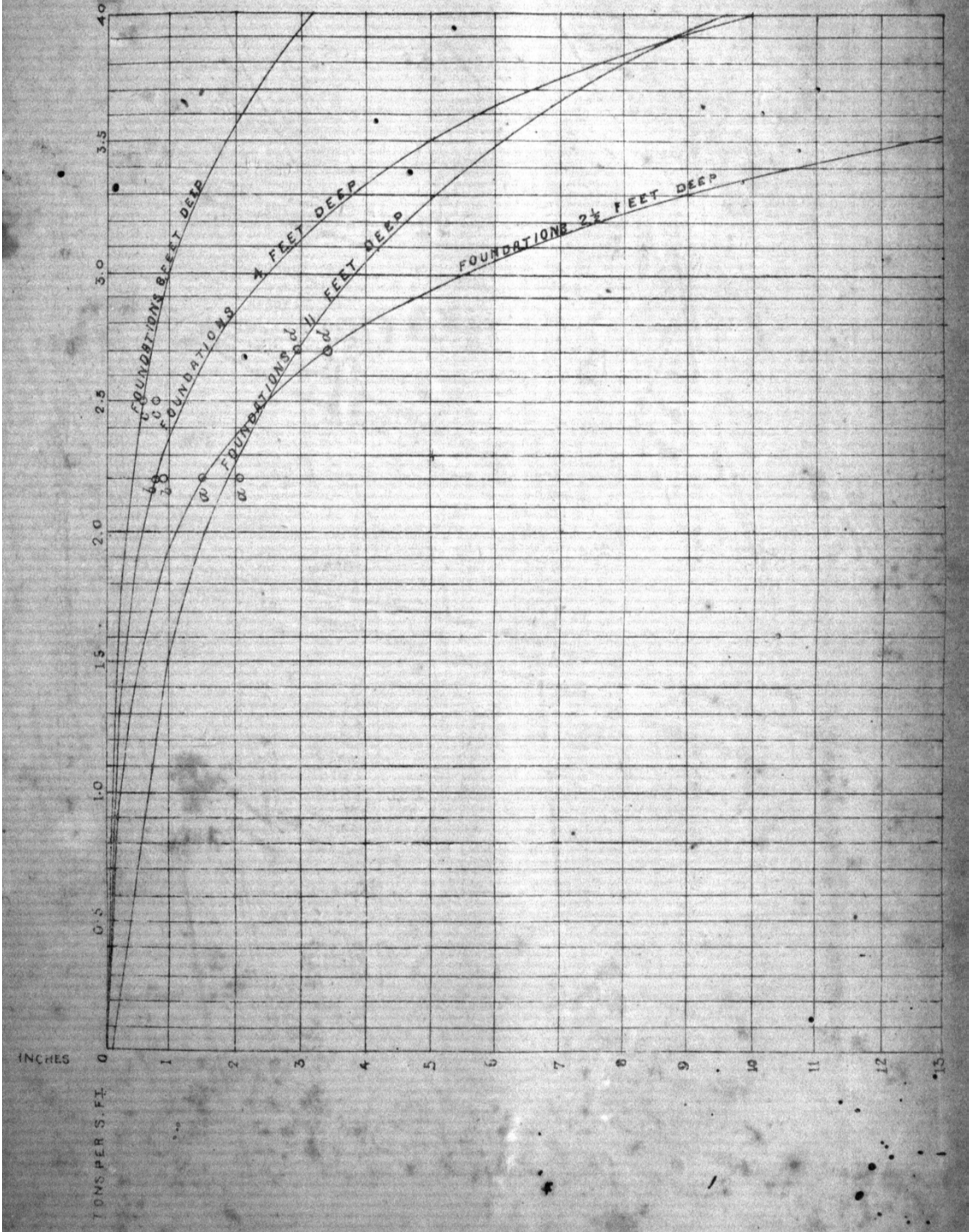
J. H. Apjohn,

Exe. Engr., Circular and Eastern Canals Division.

TABLE No. 1.

Pressure in tons per superficial foot bearing surface.	FOUNDATIONS TWO FEET DEEP.			FOUNDATIONS FOUR FEET DEEP.			FOUNDATIONS EIGHT FEET DEEP.			FOUNDATIONS ELEVEN FEET DEEP.		
	Observed sinkage in inches.	Calculated sinkage in inches. Ratio of series 1·17.	Increase of sinkage for each extra 0·1 ton pressure.		Ratio 1·15.			Ratio 1·12.			Ratio 1·10.	
0·1		0·03	......		0·02	......		0·008	......		0·23	...
0·2		0·04	0·01		0·03	0·01		0·01	0·002		0·26	0·03
0·3		0·05	0·01		**0·04**	0·01		0·02	0·01		0·29	0·03
0 4		0 06	0·01		0·05	0·01		0·03	0·01		0·32	0·03
0·5		0·08	0·02		0·06	0·01		0·04	0·01		0·36	0·04
0·6		0·10	0·02		0·07	0·01		0 05	0·01		0·40	0·04
0·7		0·12	0·02		0·09	0·02		0·06	0·01		0·44	0·04
0·8		0·15	0·03		0 11	0·02		0·07	0·01		0·49	0·05
0·9		0 18	0·03		0·12	0·02		0·08	0·01		0·54	0 05
1·0		0·22	......		0·14	......		0·10	......		0·60	...
1·1		0·26	·04		0·16	·02		0·11	·01		0·66	0·6
1·2	**0·31**	**0·31**	·05	**0·19**	**0·19**	·03		0·13	0·2		0·73	·07
1·3		0·36	·05		0·22	·03		0·15	0 2		0·80	·07
1·4		0·42	·06		0·25	·03		0·17	0·2		0·87	·07
1·5		0·50	·08		0·29	·04	**0·19**	0 19	0·2		0·96	·09
1·6		0·59	·09		0·33	0·4		0·21	0·2	**1·06**	**1 06**	·10
1·7		0·68	·09		0·38	·05		0·24	0·3		1·16	·10
1·8		0·81	·13		0·44	·06		0·27	0·3		1·27	·11
1·9		0·95	·14		0 51	·07		0·30	0·3		1·38	·11
2·0		1·12	·17		0·59	·08		0·34	0·4		1·53	·15
2·1		1·31	·19		0·68	·09		0·38	0·4		1·68	·15
2·2		1·54	·23	**0·90**	0·78	·10		0·42	0·4		1·84	·16
2·3	**2·12**	1·80	·26		**0 90**	·12		0 47	0·5		2·02	·18
2·4		**2·12**	·32		1.04	·14		0·52	0·5		2·22	·20
2·5		2·50	·38		1·20	·16	**0·69**	0·58	0·6		2·44	·22
2·6		2·93	·43		1·38	·18		**0·66**	0·8		2·68	·24
2·7		3·44	·51		1·59	·21		0·74	0·8	**3·44**	2·92	·24
2·8		4·04	·60		1·84	·25		0·83	0·9		**3·21**	·29
2·9		4·75	·71		2·12	·28		0·92	0·9		**3·53**	·32
3·0		5·57	·82		2·44	·32		1·03	·11		3·87	·34
3·1		6·55	·98		2·81	·37		1·15	·12		4·26	·39
3·2	**7·69**	**7·69**	1·14	**3·25**	**3·25**	·44		1·28	·13		4·65	·39
3·3		9·02	1·33		3·73	·48		1·43	·15		5.08	·43
3·4		10·60	1·58		4·30	·57		1·61	·18		5·58	·50
3·5		12 45	1·85		4·96	·66	**1·81**	**1·81**	·20		6·13	·55
3·6		14·61	2·16		5·71	·75		2·02	·21		6·70	·57
3·7		17·16	2·55		6·57	·86		2·26	·24	**7·31**	**7·31**	·61
3·8		20·15	2·99		7·59	1·02		2·53	·27		8·00	·69
3·9		23·65	3·50		8·75	1·16		2·83	·30		8·80	·80
4·0		27·78	3·93		10·08	1·33		3·16	·33		9·67	·87

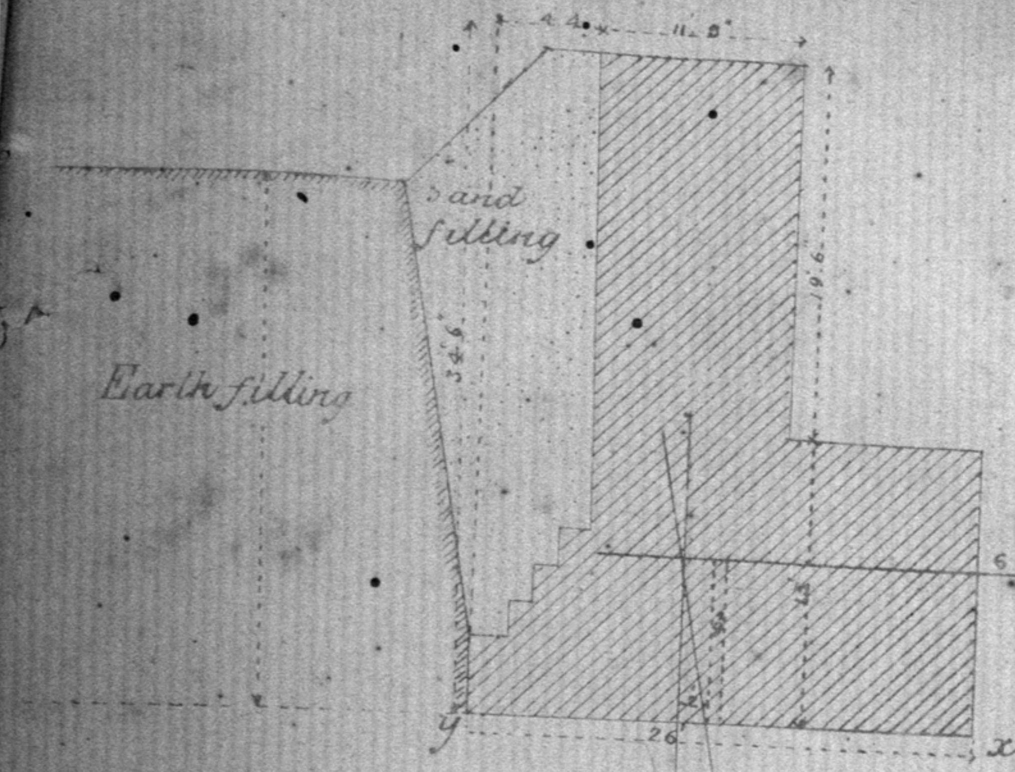
Fig. 1


FOUNDATIONS 6 FEET DEEP
FOUNDATIONS 4 FEET DEEP
FOUNDATIONS 11 FEET DEEP
FOUNDATIONS 2½ FEET DEEP
a
a
b
b
c
c
d
d
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
INCHES
TONS PER S.FT.
0
1
2
3
4
5
6
7
8
9
10
11
12
13

GAOWKHALLY LOCK

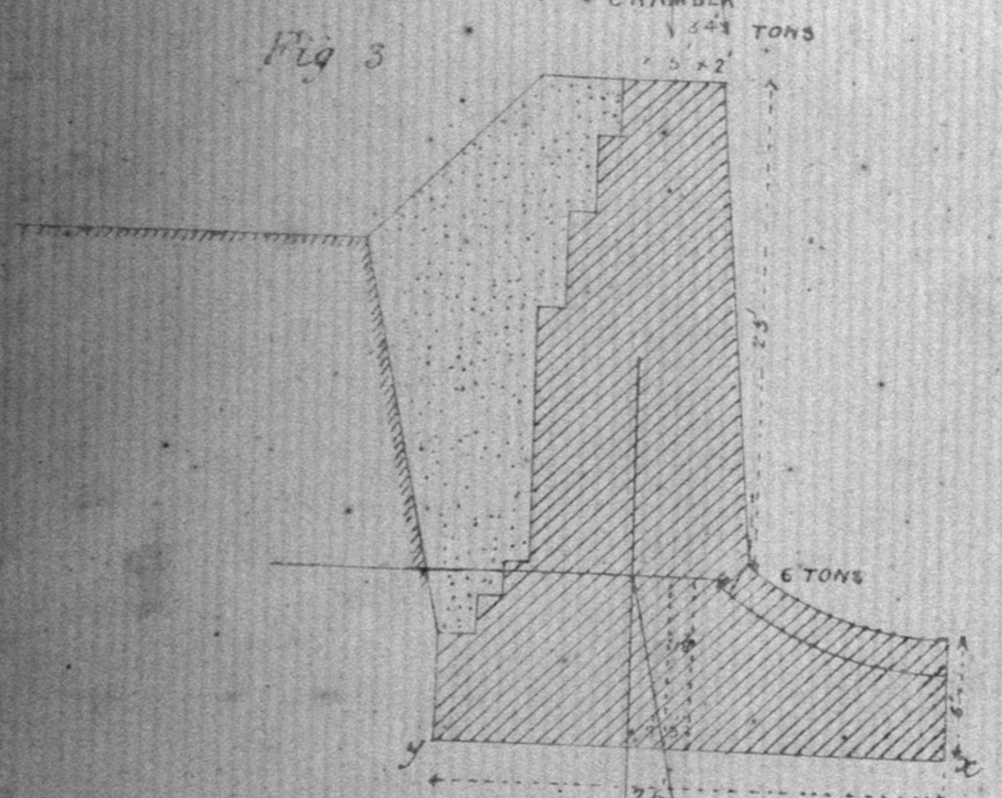
Fig 2

THROUGH UPPER SILL



THROUGH CHAMBER

Fig 3



THROUGH LOWER SILL

Fig 4

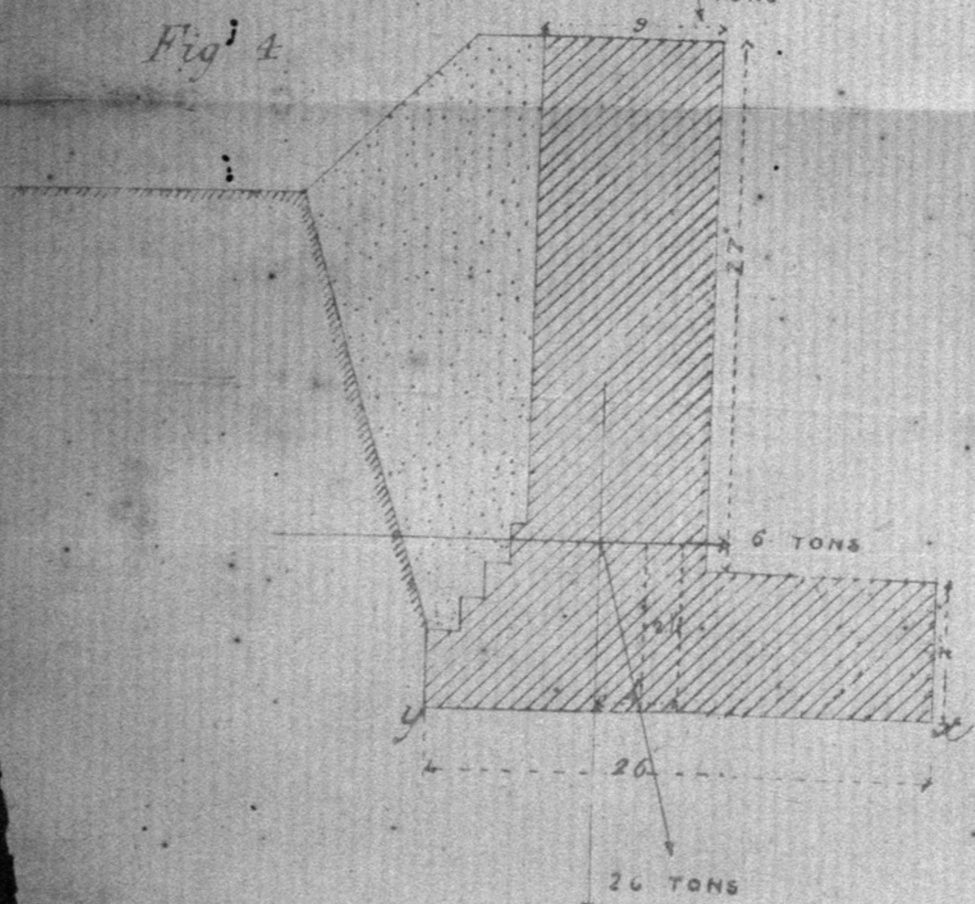
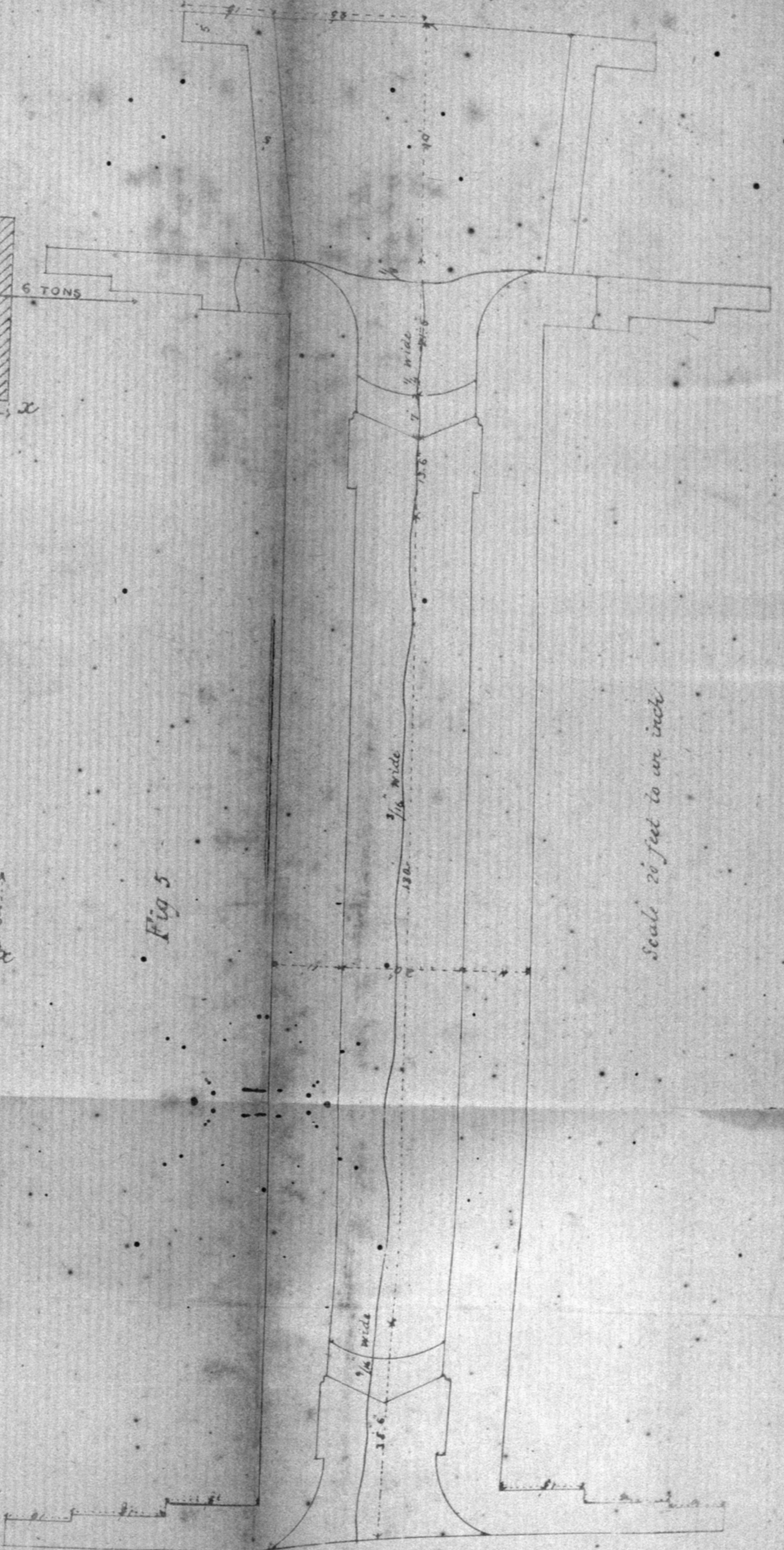
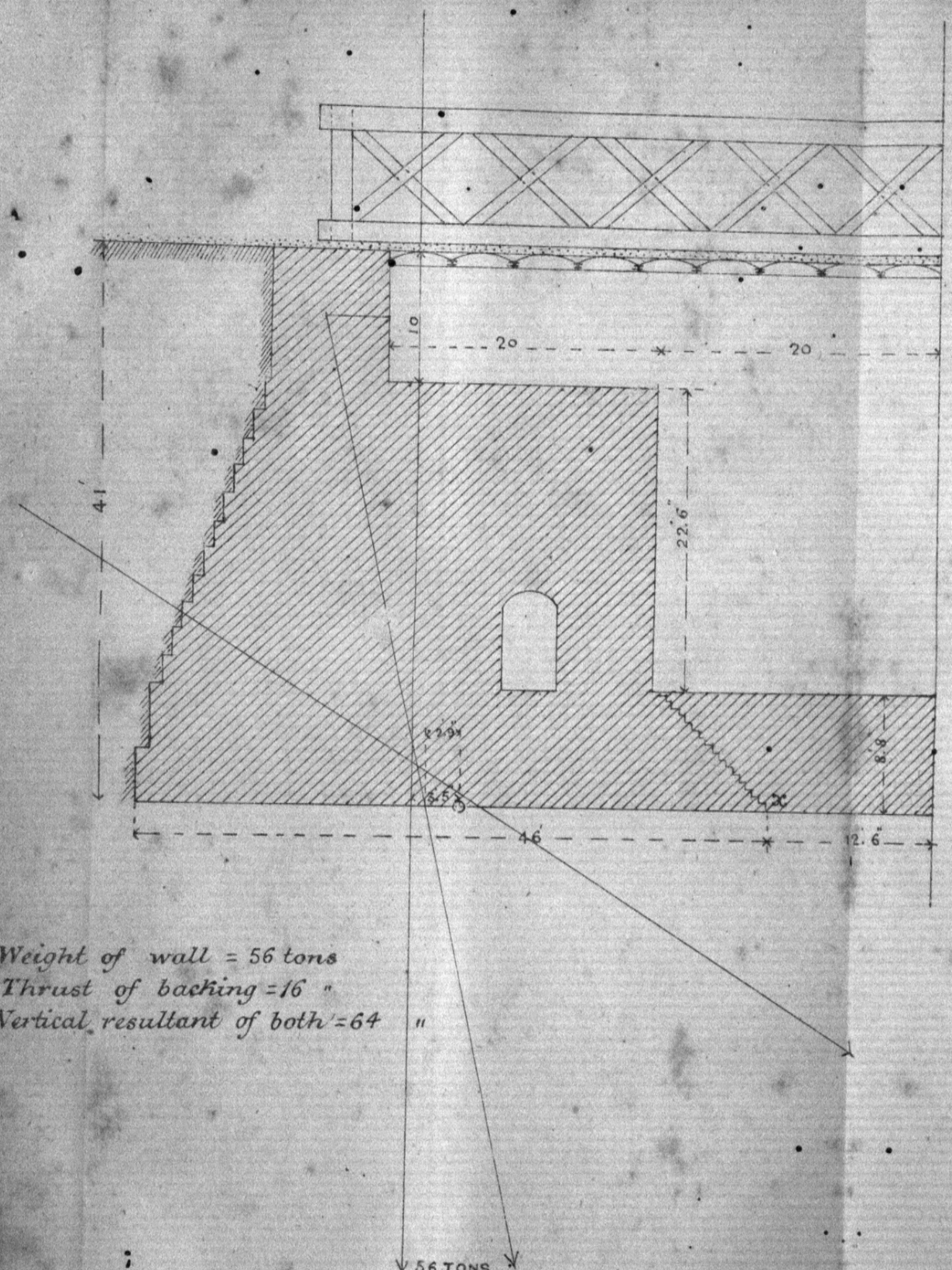


Fig 5



Scale 20 feet to an inch

fig. 6



Weight of wall = 56 tons
Thrust of backing = 16 "
Vertical resultant of both = 64 "

fig. 7

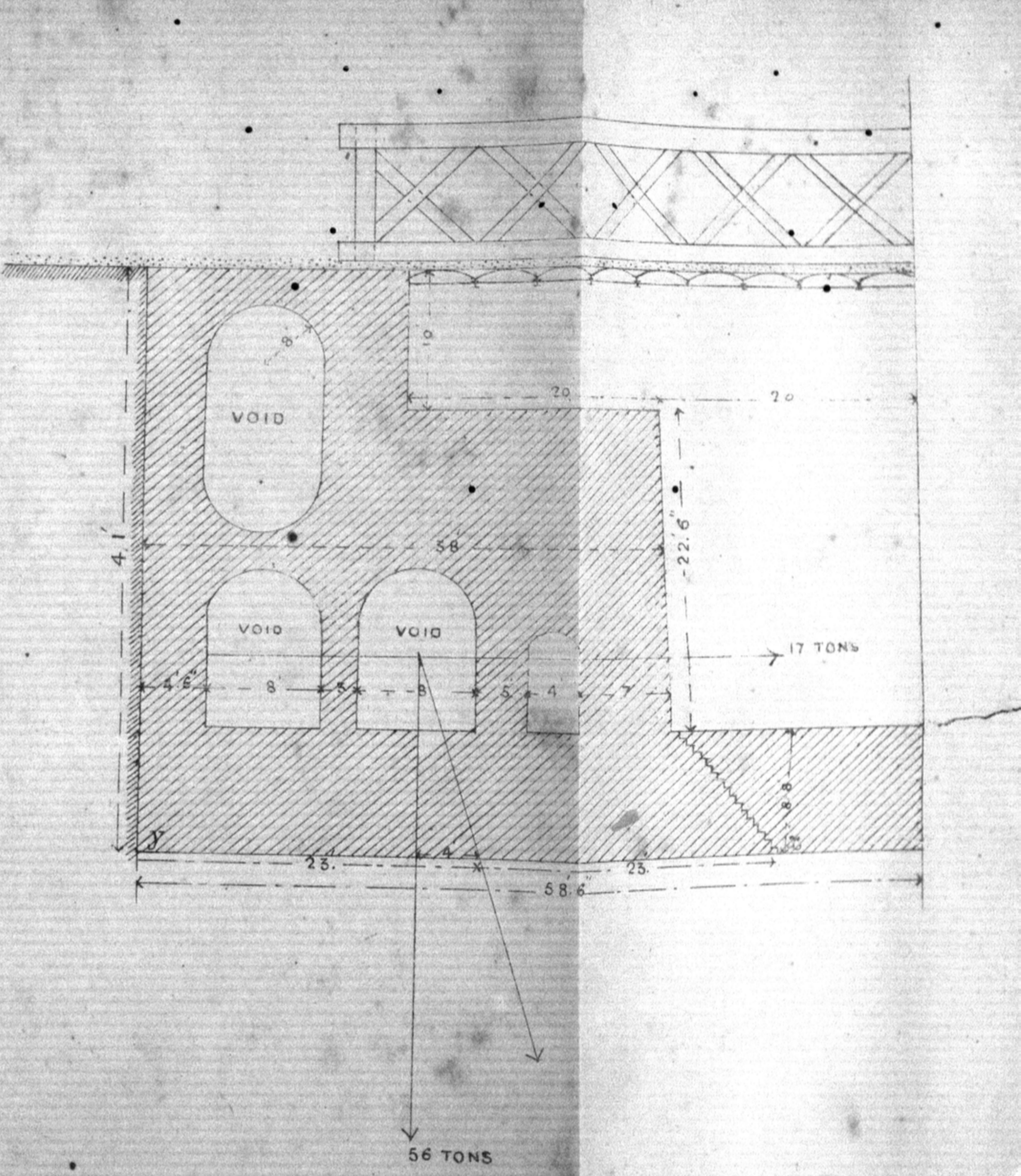


TABLE No. 2.

POSITION OF CROSS SECTION.	PRESSURE ON SUBJACENT EARTH IN TONS PER SUPERFICIAL FOOT.				CALCULATED SETTLEMENTS IN INCHES.				WIDTH OF CRACKS IN INCHES DUE TO SETTLEMENTS.			REMARKS.
	Due to weight only.		Due to resultant of weight and pressure from earth backing.		Due to weight only.		Due to resultant of weight and pressure from earth backing.		Calculated as due to weight only.	Calculated as due to weight and pressure of backing.	Actually observed.	
	At *x*.	At *y*.	At *x*.	At *y*.	At *x*.	At *y*.	At *x*.	At *y*.				
hrough upper sill ...	0·7	1·9	1·2	1·5	0·44	1·38	0·73	0·96	1·00	0·26	0·60	On 4th June 1873, Executive Engineer submitted tracing showing cracks to be 3/16″, 1/4″ and 1/8″ wide through upper sill invert and lower sill respectively. On the 17th the Superintending Engineer inspected the lock, and reported that the longitudinal crack had increased in width, being more than half an inch in upper sill; the widths have been increased for all the cracks in the ratio of 9/16 to 3/16.
,, Chamber ...	0·3	1·9	0·7	1·5	0·29	1·38	0·44	0·96	0·50	0·24	0·45	
,, lower sill ...	0·0	2·0	0·6	1·4	0·00	1·53	0·40	0·87	0·82	0·23	0·23	

Rainfall, Weather, and State and Prospects of the Crops.

Statement showing Rainfall, Weather, and State and Prospects of the Crops in the different Districts of Bengal, as reported to Government during the week ending the 19*th November* 1881.

	No.	District, and date of return.	Rainfall at Sudder Station in inches.	Character of the weather, state and prospects of the crops, and state of health at date.
		BENGAL.		
		Western Districts.		
BURDWAN DIVN.	1	Burdwan, Nov. 19 '81	Nil	Weather—cool and somewhat cloudy. Prospects of crops favourable, except in some places where want of rain has been felt. Sugarcane and *rubbee* crops are doing well. Rice selling from 20 to 30 seers per rupee.
	2	Bankoora, „ 19 „	Nil	Weather—dry and cool in the beginning of week, but latterly cloudy. Paddy in high land has suffered a loss of two annas for want of rain in places. Prospects of all other crops fair. Fever still prevalent, though abating in parts.
	3	Beerbhoom, „ 19 „	Nil	Weather—dry and cool. *Aus* crop being harvested with a good outturn. *Amun* ripening. Sowing of cold-weather crops begun. Fever very prevalent
	4	Midnapore, „ 19 „	Nil	Weather—cloudy State and prospects of crops excellent, with some exceptions. Prices low. Fever very prevalent throughout the district.
	5	Hooghly, „ 19 „	Nil	Weather—seasonable. Winter crops promise well. *Haimanti* paddy is being cut. Vegetables of all descriptions plenty in the markets. Sporadic cases of cholera reported still from Singur and Telenipara.
		Howrah, „ 21 „	Nil	Weather—cool and bright. Prospects of *amun* crop good. Winter crops being sown. Fever still reported to be prevalent in Ampta thana.
		Central Districts.		
PRESIDENCY DIVN.	6	24-Pergunnahs, Nov. 21 '81	Nil	Weather—seasonable, but south wind blowing from yesterday night (20th). Prospects of *amun* rice continue very favourable and harvesting of it has commenced. Sowing of winter crops going on. Rain wanted. Public health better than last year. Fever prevails to a considerable extent as is usual at this season. There have also been several cholera cases in north of district.
	7	Nuddea, „ 19 „	Nil	Weather—cold; cloudy and warm the last day or two. *Amun* rice is being harvested. Winter crops very well everywhere, except in Bongong; rain would improve them. Fever prevalent.
	8	Jessore, „ 19 „	Nil	Weather—clear and cold *Amun* rice very good, and being harvested in some parts of district. Prospects of winter crops favourable, but rain wanted. Much fever, but not in epidemic form
	9	Moorshedabad, „ 19 „	Nil	Weather—gradually getting cool. Outturn of *amun* expected to be a tolerable one. Sowing of winter crops going on, though impeded somewhat for want of rain in Kandi sub-division. Fever still prevails, though its has abated in some places.
RAJSHAHYE AND COOCH BEHAR DIVN.	10	Dinagepore, Nov. 18 '81	Nil	Weather—seasonable. State and prospects of crops good. Rice 22 to 38 seers per rupee.
	11	Rajshahye, „ 19 „	Nil	Weather—seasonable; sometimes cloudy. *Rubbee* crops being sown. Prospects of standing crops continue favourable. A few cholera cases reported from Puteah and Nattore stations. Fever still prevalent. Price of rice stationary.
	12	Rungpore, „ 19 „	Nil	Late rice promising. Wheat, mustard, and pulses being sown. Tobacco being planted out. Ginger and turmeric good. Sugarcane being pressed, with a good outturn. Fever prevalent at Bagdogra
	13	Bogra, „ 19 „	Nil	Weather—seasonable, but rather warm. Prospects of all crops very fair. Fever still prevails in many places.
	14	Pubna, „ 19 „	Nil	Weather—fine and cool. Prospects of late rice and winter crops favourable. Public health fair Some deaths still in Doolai thana from fever, and a few cases of cholera.
	15	Darjeeling, „ 19 „	0·06	Cold setting in; weather fair. Paddy being gathered. Sowing of barley and wheat still going on. Public health very good throughout the district.
	16	Julpigoree, „ 19 „	Nil	Weather—seasonable. *Haimanti* paddy getting ripe, and partly being reaped Outturn good. Fever to a small extent has appeared.
		Cooch Behar, „ 18 „ Mekligunge ..	Nil 0·04	Weather—seasonable; mornings foggy. Getting cold at night. Late rice being cut in a few places. Prospects of mustard-seed favourable. Transplanting of tobacco seedlings still going on. Rice selling at Rs. 2-6 per maund. Public health generally good.
		Eastern Districts.		
DACCA DIVN.	17	Dacca, Nov. 19 '81	Nil	Weather—dry and seasonable. Harvest of *amun* rice begun; outturn likely to be good. Sugarcane being cut. Pulses on high lands being sown. Public health generally good, though in some parts (Manikgunge for instance) the usual autumnal fever is prevalent.
	18	Furreedpore, „ 19 „	Nil	Weather—seasonable. Crops which are being cut are excellent. There is a good deal of severe fever about.
	19	Backergunge, „ 17 „	Nil	Weather—somewhat sultry in day; cool nights. Prospects of *aghani* and late rice good. Ploughing of high lands for cold-weather crops going on. Health generally good, with exception of some fever of not of a serious nature.
	20	Mymensingh, „ 18 „	Nil	Weather—seasonable. State and prospects of crops satisfactory. Some paddy being cut.

	No.	District, and date of return.	Rainfall at Sudder Station in inches.	Character of the weather, state and prospects of the crops, and state of health at date.
BENGAL.—*(continued.)*				
Eastern Districts.—(Continued.)				
CHITTAGONG DIVN.	21	Chittagong, Nov. 22 '81	Nil	Weather—clear, with cool mornings and evenings. Reaping of ***amun*** just commenced. Winter crops being transplanted. General health good.
	22	Noakholly „ 17 „	Nil	Weather—cool and seasonable. *Amun* progressing well. Earlier crops, such as *rajasail, lembari,* being cut; outturn good. Cold-weather crops being cultivated.
	23	Tipperah, „ 18 „	Nil	Weather—fair. State and prospects of crops generally favourable.
	24	Chittagong Hill Tracts, „ 15 „	Nil	Weather—night cool; morning foggy. Gathering of cotton and *til* still continues. Mustard being sown.
		Hill Tipperah, „ 16 „	Nil	Weather—seasonable. *Amun* rice and sugarcane doing well. Cold-weather crops being sown. Public health good.
BEHAR.				
PATNA DIVN.	25	Patna, Nov. 19 '81	Nil	Weather—cool. Prospects of paddy continue favourable. Sowing of ***rubbee*** and poppy being pushed on. A few cases of fever still reported from Behar sub-division.
	26	Gya, „ 19 „	Nil	Weather—pleasant. Harvesting of paddy will be commenced shortly. ***Rubbee*** sowing not yet finished. Fever still prevalent in some parts of the district.
	27	Shahabad, „ 19 „	Nil	Weather—fine; cold increasing. Prospects of winter rice excellent. ***Rubbee*** sowings nearly finished. Fever still prevalent.
	28	Durbhunga, „ 19 „	Nil	Weather—cool. Prospects of rice crop continue satisfactory. Tobacco very promising. Prices stationary Fever prevails in all parts of the district.
	29	Mozufferpore, „ 19 „	Nil	Weather—seasonable. Prospects of rice excellent. Sowings of ***rubbee*** nearly completed.
	30	Sarun, „ 19 „	Nil	Weather—fair and cool. Prospects of crops continue fair on the whole. Fever lessening.
	31	Chumparun, „ 19 „	Nil	Weather—seasonable. *Bhadoi* excellent. Rice progressing. Fever prevalent.
BHAGULPORE DIVN.	32	Monghyr, Nov. 19 '81	Nil	Weather—hot for the time of year; cloudy. Prospects of crops continue good. Fever still prevalent in some parts of the district.
	33	Bhagulpore, „ 19 „	Nil*	Weather—more seasonable. Crops satisfactory. General health fair.
	34	Purneah, „ 19 „	Nil	Weather—cold. *Aghani* crop being reaped in places; outturn expected to be 10 to 12 annas. Tobacco and mustard sown this year late. Fever still prevalent.
	35	Maldah, „ 19 „	Nil	Weather—cold at night and in morning; getting generally cooler, though midday heat does not seem to decrease. Late rice and *kalai* in good condition. Cold-weather crops thriving. In thanas Gomashtapur and Rotna they are still being sown. Common rice sells at from 25 to 30 seers a rupee. General health fair, though fever still prevalent in some parts of the district, especially in the town of (old) Maldah.
	36	Sonthal Perghs. „ 19 „	Nil	Weather—cold and seasonable. All crops promise well.
ORISSA.				
ORISSA DIVN.	37	Cuttack, Nov. 18 '81	Nil*	Weather—cloudy and warm. *Laghu sarad* is being harvested; *garu* or late *sarad* damaged for want of rain, and in some places being irrigated. Rain very soon wanted for *rubbee* and late *sarad*. Rice sells from 12 to 28 seers per rupee. A few cases of cholera and fever reported
	38	Pooree, „ 17 „	A few drops.	Weather—warm and cloudy throughout the week. Rain urgently wanted, and if it does not fall soon a heavy loss is feared. *Sarad* paddy almost ripe. A 12-anna crop expected. Miscellaneous crops promising. Common rice sells at from 27 to 37 Calcutta seers for the rupee. Cattle-disease still reported. Fever prevalent in the town and its suburbs.
	39	Balasore, „ 18 „	Nil	Harvesting of early rice in progress. Late rice, specially on comparatively high lands, is supposed to have been irrevocably lost to a greater or less extent. There is, however, yet hope for *garu* rice in low lands, particularly where transplantings were made after subsidence of floods, if rain falls early enough. Grain market steadily rising; average rise during week being represented by one anna in the maund. *Rubbee* wants rain badly. Public health generally good, except in some isolated localities such as Dhamnagar and Singla, where cholera is reported to have made its appearance, and Kamarda and Jellassore, where fever of malarial type continues. Cattle-disease in Bhudruck.
CHOTA NAGPORE.				
South-West Frontier Agency.				
	40	Hazaribagh, Nov. 18 '81	Nil	Weather—clear and cool. Rice being cut. Prospects of ***rubbee*** crops continue good. Public health good.
	41	Loharuggа, „ 19 „	·3 on 18th.	Weather—cloudy and damp. Excellent crops in all parts. Fever abating.
	42	Singbhoom, „ 18 „	Nil	Weather—getting colder. Rice being harvested with good outturn. Winter crops looking well.
	43	Manbhoom, „ 19 „	Nil	Rain fell this morning early, but the fall will be shown in next week's return. Weather fair and cool. Reaping of rice progresses with good outturn. *Rubbee* crops promise well. Fever still reported from Jhalda (Begoonkooder village). Public health otherwise good.

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* ·51 on 18th since reported.

Published for general information.

CALCUTTA, STATISTICAL DEPT.,
The 22nd November 1881.

COLMAN MACAULAY,
Offg. Secy. to the Govt. of Bengal.

RETAIL PRICES-CURRENT of Food-grains, Firewood, and Salt in the

Number	DISTRICTS.	QUANTITIES PER RUPEE BY														
		Wheat.			Barley.			Rice, best sort.			Rice, common.			Bulrush Millet—Cumboo, Bajra.		
		Present return.	Next preceding return.	Corresponding return of last year.	Present return.	Next preceding return.	Corresponding return of last year.	Present return.	Next preceding return.	Corresponding return of last year.	Present return.	Next preceding return.	Corresponding return of last year.	Present return.	Next preceding return.	Corresponding return of last year.
	BENGAL.															
	Western Districts.															
		S. Ch.	S. Ch.	S. Ch.	S. Ch.	S. Ch.	S. Ch.	S. Ch.	S. Ch.	S. Ch.	S. Ch.	S. Ch.	S. Ch.	S. Ch.	S. Ch.	S. Ch.
1	Burdwan	A 13 12	13 0	16 8	30 8	30 0	30 0	27 12	28 8	22 8	28 8	30 8	23 0	...	...	...
2	Bankoora	B 14 8	14 8	16 0	16 0	16 0	17 0	23 12	23 0	22 8	35 8	35 8	32 0	...	...	...
3	Beerbhoom	C 14 0	15 0	18 0	...	...	...	19 8	21 0	21 0	27 0	28 0	24 0	...	...	...
4	Midnapore	D 14 8	14 8	11 0	...	...	...	20 0	20 0	20 0	28 0	28 0	24 0	...	...	...
5	Hooghly*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	Howrah	15 8	15 8	16 0	...	...	...	16 0	16 0	15 0	21 0	20 0	20 0	...	...	...
	Central Districts.															
	Calcutta	14 0	14 0	15 0	23 0	32 0	26 10	8 0	8 0	6 12	16 0	14 8	16 0	...	...	...
6	24-Pergunnahs	E 13 5	...	...	26 0	...	...	7 4	10 0	8 0	17 12	20 0	18 14	...	...	...
7	Nuddea	F 16 0	16 0	17 4	40 0	32 0	32 0	14 8	14 8	14 8	20 0	20 0	18 13	...	...	...
8	Jessore	G 14 0	14 0	14 4	...	...	...	20 0	20 0	16 0	29 0	29 0	24 0	...	...	...
9	Moorshedabad	H 16 0	16 0	20 0	...	...	...	16 0	16 0	18 0	25 0	25 0	28 0	...	...	...
10	Dinagepore	I 14 6	14 0	16 0	20 0	20 0	26 8	21 10	22 0	24 0	29 6	32 0	31 0	...	...	...
11	Rajshahye	15 0 to 16 8	17 4	24 0	48 12	45 0	45 0	13 8	18 0	20 0	30 0	28 0 to 30 0	26 0	...	...	...
12	Rungpore	J 15 0	15 0	18 0	...	...	...	15 0	15 0	12 14	22 8	22 8	22 8	...	...	...
13	Bogra	21 12	24 0	22 8	...	...	...	18 12	18 12	24 0	30 0	33 12	37 8	...	...	...
14	Pubna	K 19 0	19 0	21 0	...	...	...	12 0	12 0	12 0	25 8	25 8	30 0	...	...	...
15	Darjeeling	L 8 0	8 0	8 0	8 0	8 0	8 0	5 0	4 8	5 0	15 0	11 0	12 0	...	...	...
16	Julpigoree	M 9 0	9 0	10 0	...	...	...	12 0	12 4	13 5	18 0	16 0	20 0	...	...	...
	Eastern Districts.															
17	Dacca	N 13 5	13 5	15 8	40 0	40 0	40 0	22 10	22 10	25 0	27 0	27 0	32 12	...	...	...
18	Furreedpore	O 21 0	21 0	21 0	32 0	33 0	40 0	8 0	8 0	6 12	25 0	25 0	24 4	...	...	...
19	Backergunge	P ...	...	...	...	...	...	20 0	21 0	16 0	28 0	28 8	20 0	...	...	...
20	Mymensingh	Q 13 8	13 0	16 0	...	...	...	20 0	24 0	20 0	26 0	25 0	26 4	...	...	...

* Return incomplete.

A In the interior prices range as follow:—Wheat 16 seers, barley 40 seers, best rice $17\frac{1}{2}$ to 24 seers, common rice 25 to $29\frac{1}{2}$ seers, gram 26 to $26\frac{1}{4}$ seers, firewood 120 seers, and salt 10 seers.

B In the interior prices range as follow:—Wheat 12 to 18 seers, barley 12 to 36 seers, best rice 20 to 27 seers, common rice 25 to 36 seers, maize or Indian-corn 18 to 52 seers, gram 12 to 24 seers, firewood 160 to 560 seers, and salt $8\frac{1}{4}$ to $12\frac{1}{2}$ seers.

C In the interior prices range as follow:—Wheat 13 to 25 seers, best rice 16 to 32 seers, common rice 24 to 36 seers, gram 18 to 35 seers, firewood 80 to 240 seers, and salt $8\frac{3}{4}$ to $10\frac{1}{2}$ seers.

D In the interior prices range as follow:—Wheat $12\frac{1}{4}$ to 15 seers, barley in Chondrakona 22 seers, best rice 17 to 25 seers, common rice 25 to 32 seers, gram 19 to $22\frac{1}{2}$ seers, firewood 64 to 260 seers, and salt 8 to 11 seers.

E In the interior prices range as follow:—Wheat $12\frac{3}{4}$ to 14 seers, barley $24\frac{10}{16}$ to 26 seers, best rice 8 to 9 seers, common rice 16 to 30 seers, bulrush millet (in Kidderpore) 14 seers, great millet (in Kidderpore) $22\frac{1}{2}$ seers, lesser millets (in Kidderpore) 17 seers, maize or Indian-corn (in Kidderpore) 17 seers, gram 21 to $22\frac{1}{2}$ seers, firewood 90 to 95 seers, and salt 10.

F In the interior prices range as follow:—Wheat 13 to 24 seers, barley 26 to 40 seers, best rice $8\frac{1}{2}$ to 20 seers, common rice 26 to 32 seers, maize or Indian-corn (in Kooshtea) 16 seers, gram 20 to 32 seers, firewood 80 to 200 seers, and salt 9 to 10 seers.

G In the interior prices range as follow:—Wheat 8 to 11 seers, best rice 9 to 25 seers, common rice 25 to 30 seers, gram 8 to 16 seers, firewood 100 to 160 seers, and salt 8 to $8\frac{1}{2}$ seers.

H In the interior prices range as follow:—Wheat 14 to $16\frac{1}{2}$ seers, barley 40 to 50 seers, best rice 17 to 22 seers, common rice 26 to 29 seers, gram 22 to 32 seers, firewood 90 to 140 seers, and salt 9 to $9\frac{1}{2}$ seers.

Districts of Bengal for the Fortnight ending 15*th November* 1881.

THE SEER OF 80 TOLAHS.

Great Millet—Cholum, Jowar.			Lesser Millet—Ragi or Murwa and Cheena.			Maize or Indian-corn.			Gram.			Firewood.			Salt.			DISTRICTS.
Present return.	Next preceding return.	Corresponding return of last year.	Present return.	Next preceding return.	Corresponding return of last year.	Present return.	Next preceding return.	Corresponding return of last year.	Present return.	Next preceding return.	Corresponding return of last year.	Present return.	Next preceding return.	Corresponding return of last year.	Present return.	Next preceding return.	Corresponding return of last year.	
																		BENGAL.
																		Western Districts.
S. Ch.	S. Ch.	S. Ch.	S. Ch.	S. Ch.	S. Ch.	S. Ch.	S. Ch.	S. Ch.	S. Ch.	S. Ch.	S. Ch.	S. Ch.	S. Ch.	S. Ch.	S. Ch.	S. Ch.	S. Ch.	
...	...	...	...	...	...	...	...	...	23 0	24 0	21 0	100 0	100 0	80 0	10 0	10 0	10 0	Burdwan.
...	...	...	...	...	...	40 0	45 0	38 0	20 8	20 0	17 0	320 0	320 0	400 0	9 0	9 0	9 0	Bankoora.
...	...	...	...	...	...	...	...	...	21 0	22 0	17 0	180 0	160 0	180 0	9 0	9 0	9 0	Beerbhoom.
...	...	...	...	...	...	...	...	...	19 0	19 0	14 0	160 0	160 0	160 0	10 0	10 0	9 0	Midnapore.
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	Hooghly.
...	...	...	...	...	...	...	...	...	22 0	22 8	18 0	80 0	80 0	80 0	10 8	10 8	10 8	Howrah.
																		Central Districts.
26 10	26 10	26 10	...	...	...	40 0	40 0	32 0	24 8	26 14	20 0	90 0	90 0	90 0	10 0	10 0	10 0	Calcutta.
...	...	...	...	...	...	...	...	...	20 0	22 8	18 14	90 0	90 0	90 0	8 8	10 0	9 8	24-Pergunnahs.
...	...	...	...	...	...	...	...	...	26 0	26 0	20 0	...	...	100 0	10 0	10 0	10 0	Nuddea.
...	...	...	...	...	...	...	...	...	19 0	20 0	16 4	110 0	110 0	110 0	8 0	8 0	8 0	Jessore.
...	...	...	...	...	...	...	...	...	33 8	33 8	25 0	120 0	120 0	120 0	9 0 to 10 0	9 0 to 10 0	10 0	Moorshedabad
...	...	...	...	...	...	...	...	...	16 0	16 0	16 0	180 0	180 0	180 0	8 12	8 12	8 8	Dinagepore.
...	...	...	...	...	...	...	...	...	20 0 to 26 4	22 8 to 26 4	19 0	240 0	240 0	240 0	9 9	9 6	10 0	Rajshahye.
...	...	...	...	...	...	...	...	...	12 0	12 0	9 0	120 0	120 0	120 0	8 12	8 12	8 12	Rungpore.
...	...	...	...	...	...	...	...	...	17 1	16 8	16 8	67 8	67 8	67 8	8 10	8 4	8 10	Bogra.
...	...	...	...	...	...	...	...	...	18 12	18 12	18 12	200 0	200 0	200 0	9 12	9 12	9 4	Pubna.
...	...	...	9 0	9 0	9 0	23 0	23 0	22 0	8 0	8 0	6 8	160 0	160 0	160 0	5 0	5 0	5 0	Darjeeling.
...	...	...	...	...	...	...	...	...	13 5	13 5	12 10	80 0	64 0	64 0	9 0	9 0	8 0	Julpigoree.
																		Eastern Districts.
...	...	...	...	...	...	...	...	...	26 8	25 0	17 6	100 0	106 8	106 0	10 0	10 0	10 0	Dacca.
...	...	...	...	...	...	...	...	...	16 0	16 0	10 4	...	...	...	9 8	9 0	10 0	Furreedpore.
...	...	...	...	...	...	...	...	...	22 0	20 0	16 0	100 0	100 0	100 0	9 4	9 0	8 8	Backergunge.
...	...	...	...	...	...	...	...	...	20 0	18 0	16 0	...	...	...	9 4	9 12	9 8	Mymensingh.

I In Raigunge the prices are—Wheat 11 seers, best rice 22½ seers, common rice 31½ seers, gram 15 seers, firewood 3½ maunds, and salt 9 seers.

J In the interior prices range as follow :—Wheat 16 to 22½ seers, barley (in Bagdogra) 24 seers, best rice 15 to 18 seers, common rice 20 to 22½ seers, lesser millets (in Kurigram) 40 seers, gram 11½ to 15 seers, firewood 80 to 180 seers, and salt 8 to $8\frac{5}{16}$ seers.

K In Serajgunge prices are—Wheat 26 seers, best rice 10 seers, common rice 29 seers, gram 12 seers, and salt 9 seers.

L In Silliguri prices are—Best rice 12 seers, common rice 15 seers, maize or Indian-corn 20 seers, gram 11 seers, firewood 160 seers, and salt 8 seers.

M In the interior prices range as follow :—Best rice 10 to 13¼ seers, common rice 12 to 20 seers, gram 8 to $13\frac{5}{16}$ seers, firewood 64 to 80 seers, and salt $6\frac{7}{16}$ to 8 seers.

N In the interior prices range as follow :—Wheat (in Jaffergunge) 20 seers, barley (in Jaffergunge) 40 seers, best rice 16 to 25 seers, common rice 25 to 30 seers, gram 20 to 32 seers, firewood 80 to 120 seers, and salt 8 to 10 seers.

O In the interior prices range as follow :—Wheat (in Goalundo) 19 seers, barley (in Goalundo) 26 seers, best rice 12 to 22 seers, common rice 28 to 32 seers, gram 13 to 18 seers, firewood 120 to 200 seers, and salt 8 to 10 seers.

P In the interior prices range as follow :—Best rice 20 to 27 seers, common rice 24 to 34 seers, gram 10 to 20 seers, firewood 60 to 200 seers, and salt 8 seers.

Q In the interior prices range as follow :—Wheat 10 to 13½ seers, best rice 10 to 30 seers, common rice 20 to 35 seers, gram 10 to 16 seers, and salt 8 to 9¾ seers.

RETAIL PRICES-CURRENT of Food-grains, Firewood, and Salt in the

Number.	DISTRICTS.	QUANTITIES PER RUPEE BY														
		WHEAT.			BARLEY.			RICE, BEST SORT.			RICE, COMMON.			BULRUSH MILLET—CUMBOO, BAJRA.		
		Present return.	Next preceding return.	Corresponding return of last year.	Present return.	Next preceding return.	Corresponding return of last year.	Present return.	Next preceding return.	Corresponding return of last year.	Present return.	Next preceding return.	Corresponding return of last year.	Present return.	Next preceding return.	Corresponding return of last year.
	Eastern Districts.—(Contd.)	S. Ch.	S. Ch.	S. Ch.	S. Ch.	S. Ch.	S. Ch	S. Ch.	S. Ch.	S. Ch.	S. Ch	S. Ch.	S. Ch.	S. Ch.	S. Ch.	S. Ch.
21	Chittagong	R 11 0	11 4	12 4	...	...	...	16 0	16 0	17 0	25 0	23 0	25 0	...	...	...
22	Noakholly	S ...	...	...	...	...	...	21 0	21 0	20 0	27 0	26 0	29 0	...	...	...
23	Tipperah	12 8	12 8	14 0	...	...	...	24 12	25 0	26 0	36 8	36 0	43 0	...	...	...
24	Chittagong Hill Tracts ...	...	...	...	...	...	...	16 0	16 0	16 0	17 12	17 12	20 0	...	...	...
	Hill Tipperah	10 0	10 0	9 0	...	...	...	19 0	19 0	17 0	30 0	28 0	25 0	...	...	...
	BEHAR.															
25	Patna	21 0	22 0	21 0	40 0	40 0	32 0	14 0	14 0	13 5	22 0	22 0	20 0	...	...	...
26	Gya	T 20 8	20 0	22 4	37 0	37 0	32 8	13 12	13 0	9 8	23 0	23 0	22 8	...	...	...
27	Shahabad	U 16 0 to 18 0	16 0 to 18 0	21 0	37 0	31 8	34 0	20 0 to 21 0	20 0 to 21 0	19 0	22 0	22 0	21 0	...	...	...
28	Durbhunga	V 14 0	16 8	23 0	40 0	35 0	30 0	15 8	13 0	13 0	19 0	17 0	19 8	...	...	...
29	Mozufferpore	17 0	16 0	25 0	35 0	35 0	40 0	12 0	12 0	11 0	19 0	19 0	17 0	...	...	...
30	Sarun	17 0	17 0	18 8	42 0	40 0	45 0	10 0	10 0	9 8	22 0	22 0	21 0	...	...	...
31	Chumparun	W 21 0	22 0	22 0	50 0	50 0	40 0	14 0	14 0	12 0	30 0	30 0	19 0	...	...	...
32	Mongbyr	X 17 13	16 12	21 0	42 0	42 0	42 0	14 11	15 12	16 12	17 13	21 0	22 0	...	...	...
33	Bhagulpore	Y 15 2	13 14	17 11	37 13	37 14	37 14	17 10	16 6	18 5	20 3	18 15	20 3	...	...	...
34	Purneah	Z 16 0	16 0	18 0	40 0	40 0	40 0	20 0	20 0	20 0	25 0	32 0	22 0	...	...	...
35	Maldah	15 0	16 0	19 0	...	...	...	16 0	16 0	17 0	27 0	28 0	26 0	...	...	...
36	Sonthal Pergunnahs	Z1 13 4	13 0	13 8	...	...	...	23 0	23 0	20 0	25 0	25 0	25 0	...	...	...
	ORISSA.															
37	Cuttack	15 12	15 12	14 7	...	...	...	15 12	15 12	14 7	23 10*	24 15	19 11	...	...	...
38	Pooree	12 8	12 8	10 0	...	...	...	20 0	20 0	12 0	25 0	25 0	21 0	...	...	...
39	Balasore	11 0	13 0	16 0	...	...	...	22 0	22 0	20 0	26 0	32 0	26 0	...	...	...
	CHOTA NAGPORE. *South-Western Frontier Agency.*															
40	Hazareebagh	Z2 17 0	18 0	22 0	36 0	...	39 0	14 0	14 0	14 0	25 0	24 0	24 0	...	...	...
41	Lohardugga	Z3 16 0	16 0	16 0	24 0	24 0	...	20 0	20 0	24 0	24 0	23 0	32 0	...	...	...
42	Singbhoom	24 0	24 0	16 0	40 0	40 0	32 0	32 0	32 0	36 0	36 0	36 0	40 0	...	...	...
43	Manbhoom	Z4 14 0	13 0	14 0	...	...	24 0	18 0	21 0	20 0	35 0	35 0	30 0	...	...	...

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* In the interior price of common rice varies from 21 to $32\frac{13}{16}$ seers per rupee.

R In the interior prices range as follow:—Best rice 23 to 24 seers, common rice 26 to 32 seers, firewood (in Cox's Bazar) 214 seers, and salt 8 to 9 seers.

S In the interior prices range as follow:—Best rice 19 to 32 seers, common rice 25 to 40 seers, and salt 7 to 8 seers.

T In the interior prices range as follow:—Wheat 21 to $21\frac{3}{4}$ seers, barley 42 to 45 seers, best rice (in Aurungabad) 22 seers, common rice $25\frac{1}{2}$ to 26 seers, lesser millets (in Nowada) 50 seers, maize or Indian-corn 40 to $48\frac{1}{2}$ seers, gram 32 to 40 seers, firewood $3\frac{1}{2}$ to $4\frac{1}{4}$ maunds, and salt 8 to $9\frac{6}{16}$ seers.

U In the interior prices range as follow:—Wheat 17 to 19 seers, barley 30 to 40 seers, best rice $11\frac{1}{2}$ to 17 seers, common rice $19\frac{1}{2}$ to 24 seers, bulrush millet (in Buxar) 31 seers, great millet (in Buxar) 32 seers, lesser millets 40 to 41 seers, maize or Indian-corn 34 to 40 seers, gram 30 to 32 seers, firewood $2\frac{1}{4}$ to 6 maunds, and salt 8 to $9\frac{1}{4}$ seers.

V In Tajpore prices are—Wheat 20 seers, barley 40 seers, best rice 13 seers, common rice 20 seers, murwa 45 seers, maize or Indian-corn 50 seers, gram 30 seers, firewood 5 maunds, and salt 9 seers.

W In the interior prices range as follow—Wheat 20 to 33 seers, barley 40 to 65 seers, best rice $12\frac{1}{2}$ to 21 seers, common rice 20 to 35 seers lesser millets 52 to 63 seers, maize or Indian-corn 53 to $72\frac{1}{2}$ seers, gram 24 to 40 seers, firewood (in Bettiah) 160 seers, and salt $7\frac{1}{2}$ to 11 seers.

X In Begu serai prices are—Wheat 17 seers, barley 60 seers, best rice 21 seers, common rice 24 seers, great millet 55 seers, lesser millets 37 seers, maize or Indian-corn 60 seers, gram 45 seers, firewood 4 maunds, and salt 8 seers.

CALCUTTA,
The 22nd November 1881.

Districts of Bengal for the Fortnight ending 15*th November* 1881.—(Concld.)

THE SEER OF 80 TOLAS.

GREAT MILLET—CHOLUM, JOWAR.			LESSER MILLET—RAGI OR MURWA AND CHEENA.			MAIZE OR INDIAN-CORN.			GRAM.			FIREWOOD.			SALT.			DISTRICTS.
Present return.	Next preceding return.	Corresponding return of last year.	Present return.	Next preceding return.	Corresponding return of last year.	Present return.	Next preceding return.	Corresponding return of last year.	Present return.	Next preceding return.	Corresponding return of last year.	Present return.	Next preceding return.	Corresponding return of last year.	Present return.	Next preceding return.	Corresponding return of last year.	
																		Eastern Districts.—(Contd.)
S. Ch.	S. Ch.	S. Ch.	S. Ch.	S. Ch.	S. Ch.	S. Ch.	S. Ch.	S. Ch.	S. Ch.	S. Ch.	S. Ch.	S. Ch.	S. Ch.	S. Ch.	S. Ch.	S. Ch.	S. Ch.	
...	...	...	...	...	...	...	...	...	13 0	17 0	16 0	80 0	80 0	80 0	11 0	10 0	10 0	Chittagong.
...	...	...	...	...	...	...	...	...	16 0	15 0	8 0	...	...	...	8 0	8 0	8 0	Noakholly.
...	...	...	...	...	...	...	...	...	19 0	19 0	16 0	...	...	...	9 12	9 12	9 12	Tipperah.
...	...	...	...	...	...	...	...	...	...	...	...	320 0	320 0	320 0	8 0	8 0	8 0	Chittagong Hill Tracts.
...	...	...	...	...	...	...	...	...	10 0	9 0	9 0	...	...	...	8 0	8 0	8 0	Hill Tipperah.
																		BEHAR.
...	...	...	...	...	...	50 8	40 0	35 0	40 0	39 0	28 0	130 0	130 0	100 0	9 15	9 10	9 13	Patna.
...	...	...	35 0	36 0	41 0	42 8	35 0	38 0	34 0	33 0	27 0	160 0	160 0	140 0	9 0	9 0	9 0	Gya.
...	...	...	...	...	...	39 0	37 8	34 0	31 0 to 32 0	32 0	26 8	120 0	120 0	120 0	10 0	10 0	9 0	Shahabad.
...	...	...	40 0	40 0	30 0	45 0	40 0	30 0	30 0	25 0	21 0	160 0	120 0	140 0	8 8	8 12	8 8	Durbhunga.
...	...	...	...	...	...	60 0	60 0	34 0	30 0	30 0	30 0	140 0	140 0	120 0	9 0	9 0	9 8	Mozufferpore.
41 0	39 0	35 0	34 0	32 0	31 0	42 0	39 0	34 0	30 0	30 0	26 8	160 0	160 0	160 0	9 0	9 0	9 0	Sarun.
...	...	...	...	...	...	60 0	65 0	34 0	36 0	36 0	26 0	...	...	...	8 8	8 8	8 8	Chumparun.
...	...	...	...	...	...	73 0	60 0	40 10	33 9	50 0	33 9	126 0	126 0	126 0	8 6	8 6	9 7	Monghyr.
...	...	...	...	...	...	63 2	56 12	44 3	32 13	32 13	27 12	137 8	137 8	126 4	9 7	9 7	9 7	Bhagulpore.
...	...	...	...	...	...	...	...	...	22 0	23 0	18 0	120 0	120 0	120 0	8 0	8 0	8 0	Purneah.
...	...	...	...	...	...	...	...	...	21 0	22 0	20 0	120 0	120 0	120 0	9 0	9 0	9 0	Maldah.
...	...	...	...	...	...	60 0	60 0	50 0	22 0	24 0	18 0	200 0	200 0	200 0	8 0	8 0	8 0	Sonthal Perghs.
																		ORISSA.
...	...	...	17 1	21 0	18 6	...	...	...	22 5	23 10	17 1	160 0	160 0	160 0	11 0	10 0	12 0	Cuttack.
...	...	...	...	...	...	...	...	...	18 12	17 8	12 0	105 0	105 0	100 0	11 0	11 0	11 13	Pooree.
...	...	...	...	...	...	...	...	...	14 0	16 0	12 4	128 0	128 0	76 0	9 3	9 3	9 8	Balasore.
																		CHOTA NAGPORE. *South-Western Frontier Agency.*
...	...	...	48 0	48 0	48 0	42 0	48 0	48 0	24 0	26 0	24 0	240 0	240 0	240 0	8 0	8 0	8 0	Hazareebagh.
...	...	...	44 0	40 0	64 0	40 0	36 0	36 0	17 0	17 0	16 0	140 0	140 0	160 0	7 0	7 0	7 8	Lohardugga.
...	...	...	...	...	...	...	...	...	21 0	21 0	16 0	160 0	160 0	160 0	7 0	6 0	6 8	Singbhoom.
50 0	...	40 0	64 0	64 0	64 0	...	...	64 0	21 0	21 8	15 0	160 0	160 0	160 0	8 8	8 8	9 0	Manbhoom.

Y In the interior prices range as follow:—Wheat 16 to 21 seers, barley 32 to 80 seers, best rice 21 to 30 seers, common rice 22 to 35 seers, lesser millets 60 to 75 seers, maize or Indian-corn (in Banka) 1½ maunds, gram 25 to 28 seers, firewood 4 maunds, and salt 8 to 9 seers.

Z In the interior prices range as follow:—Wheat 13 to 20 seers, barley 40 seers, best rice 14 to 20 seers, common rice 23 to 30 seers, gram 13 to 25 seers, firewood 64 to 120 seers, and salt 8 to 9 seers.

Z1 In Godda prices are—Wheat 15 seers, barley 25 seers, best rice 25 seers, common rice 31¼ seers, maize or Indian-corn 70 seers, gram 26 seers, firewood 3 maunds, and salt 8 seers.

Z2 In the interior prices range as follow:—Wheat 16 seers, barley 30 seers, best rice 15 seers, common rice 25 to 30 seers, lesser millets 40 to 60 seers, maize or Indian-corn 40 seers, gram 24 to 30 seers, firewood 200 to 320 seers, and salt 8 seers.

Z3 In Daltongunge prices are—Wheat 23·50 seers, barley 35 seers, best rice 17 seers, common rice 23·50 seers, bulrush millet 50 seers, murwa 40 seers, maize or Indian-corn 40 seers, gram 27 seers, and salt 7·50 seers.

Z4 In the interior prices range as follow:—Wheat 12 to 16 seers, barley (in Govindpore) 26 seers, best rice 18 to 36 seers, common rice 26 to 43 seers, bulrush millet (in Jhalda) 22 seers, great millet (in Govindpore) 80 seers, lesser millets (in Govindpore) 70 seers, maize or Indian-corn (in Burrabazar) 70 seers, gram 12 to 22 seers, firewood 6 to 20 maunds, and salt 8 to 10 seers.

Published for general information.

COLMAN MACAULAY,
Offg. Secy. to the Govt. of Bengal.

WHOLESALE PRICES-CURRENT of Food-grains, Firewood, and Salt in

Number.	MARTS.	PRICES PER MAUND														
		WHEAT.			BARLEY.			RICE, BEST SORT.			RICE, COMMON.			BULRUSH MILLET—CUMBOO, BAJRA.		
		Present return.	Next preceding return.	Corresponding return of last year.	Present return.	Next preceding return.	Corresponding return of last year.	Present return.	Next preceding return.	Corresponding return of last year.	Present return.	Next preceding return.	Corresponding return of last year.	Present return.	Next preceding return.	Corresponding return of last year.
		R. A. P.	R. A. P.	R. A. P.	R. A. P.	R. A. P.	R. A. P.	R. A. P.	R. A. P.	R. A. P.	R. A. P.	R. A.P.	R. A. P.	R.A.P.	R.A.P.	R.A.P.
1	Calcutta ...	2 14 0	2 14 0	2 10 0	1 12 0	1 4 0	1 8 0	5 0 0	5 0 0	6 0 0	2 8 0	2 11 0	2 8 0	...	...	...
2	Serajgunge ...	1 8 0	1 8 0	1 10 0	...	...	...	3 12 0	3 12 0	3 12 0	1 5 0	1 7 0	1 8 0	...	...	...
3	Dacca ...	3 0 0	3 0 0	2 10 0	1 0 0	1 0 0	1 0 0	1 12 0	1 12 0	1 9 0	1 6 0	1 6 0	1 3 0	...	...	...
4	Naraingunge..	...	...	...	...	...	...	1 10 0	1 6 0	1 8 0	1 7 0	1 4 0	1 4 0	...	...	...
5	Chittagong ...	...	...	...	...	...	...	2 8 0	2 8 0	2 4 0	1 8 0	1 11 0	1 8 0	...	...	...
6	Patna ...	1 14 6	1 13 0	1 14 0	1 0 0	1 0 0	1 4 0	2 14 0	2 14 0	3 0 0	1 13 0	1 13 0	2 0 0	...	...	...
7	Balasore ...	3 12 0	3 2 0	2 8 0	...	...	...	1 12 0	1 12 0	2 0 0	1 9 0	1 3 0	1 9 0	...	...	...
8	Pooree ...	...	...	...	...	...	...	...	...	...	1 9 3	1 9 3	2 0 0	...	...	...
9	Cuttack ...	2 5 0	2 5 0	2 10 0	...	...	...	2 5 0	2 5 0	2 10 0	1 8 0	1 9 0	1 14 0	...	...	...

CALCUTTA,
The 22nd November 1881.